



Stantec Consulting Services Inc.
5801 Pelican Bay Boulevard, Suite 300 Naples FL 34108

DCF0000-32

October 11, 2016
File: 215510549

Attention: Ms. Marie Dessources
South Florida Water Management District
2301 McGregor Boulevard
Fort Myers, Florida 33901

Reference: Osprey Cove Fifth Annual Monitoring Report

Dear Ms. Dessources,

Enclosed please find a copy of the Osprey Cove Fifth Annual Monitoring Report that was submitted to South Florida Water Management District electronically on October 11, 2016 through the ePermitting web site. Please contact me at your earliest convenience to schedule a final site inspection.

Regards,

STANTEC CONSULTING INTERNATIONAL LLC

Thomas T. Trettis, PWS, CSE
Senior Ecologist
Phone: (239) 649-4040

c. Koreshan Conservation Area, Inc. w/encl.
Lee County Environmental Services Department w/encl.
Sarah Spector, Becker-Poliakoff w/encl.

Design with community in mind

**OSPREY COVE FIFTH ANNUAL
MONITORING REPORT**

SFWMD Permit #36-04886-P

Lee County D.O. #2004-00207



Prepared for:

Koreshan Conservation Area, Inc
200 West Forsyth Street, Suite 1300
Jacksonville, Florida 32202

Prepared by:

Stantec Consulting Services Inc.
5801 Pelican Bay Boulevard, Suite 300
Naples, Florida 34108

Submitted to:

South Florida Water Management District
2301 McGregor Boulevard
Fort Myers, Florida 33901

OCTOBER 2016

Table of Contents

1.	INTRODUCTION	1
2.	INITIAL EXOTIC AND NUISANCE VEGETATION ERADICATION	2
3.	METHODOLOGY.....	2
3.1	INDIGENOUS HABITAT RESTORATION AREA A.....	6
3.2	INDIGENOUS HABITAT RESTORATION AREA B	6
3.3	INDIGENOUS HABITAT RESTORATION AREA C	6
3.4	INDIGENOUS HABITAT RESTORATION AREA D.....	6
4.	RESULTS AND DISCUSSION.....	7
5.	MONITORING AND MAINTENANCE SCHEDULE	14
6.	HYDROLOGY	14
7.	WILDLIFE SPECIES AND SIGNS OBSERVED	15
8.	SUMMARY	16
9.	FUTURE MONITORING AND MAINTENANCE SCHEDULE.....	17

LIST OF TABLES

Table 1 - Transect #1 Vegetative Data	9
Table 2 - Transect #2 Vegetative Data	11
Table 3 - Transect #3 Vegetative Data	13
Table 4 - Wildlife Observations.....	15

LIST OF EXHIBITS

Exhibit 1 Transect Location Map	18
Exhibit 2 Indigenous Preserves and Photo Station Exhibit	19

LIST OF APPENDICES

APPENDIX A	PHOTOS TAKEN FROM TRANSECT PHOTO STATIONS.....	20
APPENDIX B	PHOTOS TAKEN FROM INDIGENOUS HABITAT PHOTO STATIONS.....	35

1. Introduction

The South Florida Water Management District (SFWMD) issued Individual Environmental Resource Permit #36-04886-P on June 10, 2004 authorizing the residential development known as Osprey Cove. The Osprey Cove development includes several multi-family residential housing units and required several areas of native habitat to be preserved as on-site wetland preserves and upland indigenous habitats. Wetland and upland habitats have been preserved as conservation areas as part of the on-site mitigation for the project's permitted impacts to jurisdictional wetlands. The environmental special conditions of the environmental resource permit (ERP) required preserved native habitats to be replanted and restored following the initial mechanical exotic removal. In addition, mitigation or preservation areas are to be maintained free of exotic vegetation and nuisance vegetation shall also be controlled in perpetuity. The restoration of wetland and upland conservation areas has been accomplished by the installation of native plantings similar to species that would have been expected to have been present historically on site, in a natural, undisturbed condition and prior to the invasion of exotic and nuisance vegetation that previously dominated the site.

This report documents the completion of the initial exotic removal, verification of the native species plantings and continued documentation that the required planted wetland and upland species have survived and re-established targeted natural community types within the preserved habitats. In addition, numerous desirable native wetland species have naturally colonized and are spreading throughout the preserved wetland habitat. A list of the original native vegetative plantings and the current percent survival/percent coverage by planted species is included in this report. The vegetative data collected and other information recorded during this monitoring event was conducted along the original established monitoring transects to the greatest extent practical given there was an almost eight (8) year gap between the 2nd and third annual monitoring events. The monitoring was conducted in accordance with the Environmental Special Conditions included in the original ERP permit.

The Environmental Special Conditions included in the SFWMD ERP permit require the permittee to implement a wetland monitoring and maintenance program for the wetland and upland conservation areas. This program, in accordance with all of the environmental special conditions, required that permanent vegetation monitoring transects be established within representative sections of the mitigation areas that were monitored. Permit conditions also required the installation of a continuous read groundwater water-table well within the wetland mitigation habitat. Data collected from the monitoring transects and the water-table well was included in each annual monitoring report submitted to the SFWMD and Lee County in accordance with the attached monitoring schedule.

2. Initial Exotic and Nuisance Vegetation Eradication

The initial mechanical exotic removal and eradication was completed in 2005 and early 2006. Once the exotic and nuisance species had been removed from the designated preserve habitats, native trees, shrubs and herbaceous species were installed in the areas left denuded by the mechanical exotic removal. Due to the dense monoculture of *Melaleuca* throughout much of the site, some of the exotic removal areas were extensive and nearly denuded upon completion of the exotic removal. Following the initial plantings, temporary irrigation was installed within the upland preserves to assure survival of the plantings in those habitats. Conditions observed in the 3rd annual monitoring report submittal in 2014, indicated that a majority of the plantings had survived the extended period between monitoring events. With the exception of some incidental nuisance and exotic vegetation present, both the upland and wetland preservation areas are currently in compliance with special conditions of the ERP permit. Observations made during the fifth annual monitoring inspection indicate that a majority of the planted vegetation continues to survive and is flourishing. While at the same time, the overall coverage of nuisance and exotic species continues to decline. Conditions are expected improve now that the previously undeveloped, exotic plant infested property to the west has been cleared and is now developed into a new Walmart facility.

The most recent nuisance and exotic maintenance event was being completed at the time of this inspection during October 2016. Seedlings and saplings of Brazilian pepper, *Melaleuca*, ear-leaf acacia, climbing cassia, Java plum and any other undesirable species continue to be targeted and chemically treated. Due to the continued presence of an extensive seed bank on the eastern side of the property, regular and periodic exotic/plant eradication efforts will continue to be performed to control these undesirable species. Now that regular maintenance is taking place, nuisance and exotic species are anticipated to eventually be eradicated from the preserves.

3. Methodology

The field monitoring and data collection activities for the Fifth Annual Monitoring Report were performed on September 29, 2016 by Stantec Consulting Senior Ecologists Craig D. Schmittler, CSE, PWS and Tom Trettis, CSE, PWS.

The transect/photo station location exhibit included with the Fifth Annual Monitoring Report depicts the approximate location of the monitoring transects and associated photo stations. Also shown are the four (4) indigenous preserve habitats required by Lee County and the associated photo stations for those areas. The length and orientation of each transect used for this event approximate the original monitoring transects and incorporate the same stations used in the previous monitoring reports. Most of the same PVC station markers are being used for this monitoring event, but a few new markers had to be re-established when the previous markers were missing or could not be located following the eight year gap in monitoring events. As with the original monitoring program, these transects have been established to monitor conditions present in the various habitat types within the preservation areas.

Osprey Cove Fifth Annual Monitoring Report

Transects #1 and #2 are located within the preserved wetland habitat centrally located on the western edge of the property. Transect #3 is located within the preserved upland habitat (gopher tortoise preserve) located on the southern edge of the site. Four additional photo stations are also included in this report to document the survival and preservation of the indigenous habitat required by Lee County. These additional photo stations (one per area) have been re-established in their original locations to document the current condition within the four (4) indigenous habitat restoration areas as shown on the photo station location exhibit. Supplemental plantings were required in preserved habitats (including most of the indigenous preserve habitats) following the initial mechanical removal of nuisance and exotic vegetation. Plantings were intended to re-establish the native trees, shrubs and herbaceous vegetation that had been displaced by the dense exotic monoculture on the property at the time the permit was issued. The monitoring transects and photo stations were installed within these supplemental planting habitats to document the survival and establishment of the newly installed plantings per the special conditions of the regulatory permits.

Three (3) permanent monitoring transects of varying lengths were established within the preserved conservation habitats in general conformance with the locations and orientations specified in the environmental special conditions of the permit and subsequent letter modification. The data collected during each monitoring annual event was compared to past monitoring data to allow documentation of the vegetative changes within the preserved habitats. In addition, collected data was used to evaluate the success of the exotic and nuisance eradication and maintenance efforts as well as the success of the replanting efforts.

TRANSECT 1 is oriented in a general northwest to southeast direction and traverses an area that was completely denuded by the mechanical clearing of the dense *Melaleuca* monoculture previously present in this portion of the property. The vegetation throughout this general area was replanted as part of the initial restoration efforts following exotic removal. Transect 1 begins in a restored upland habitat in the far northwestern corner of the large wetland preserve. The transect continues through a forested, transitional habitat and angles toward the southeast. Transect 1 terminates within the edge of a small depressional, freshwater marsh wetland system located north of the preserved cypress wetland in the southern edge of this preserve.

The planted vegetation in the vicinity of Photo Station #1 included slash pine (*Pinus elliottii*), laurel oak (*Quercus laurifolia*), live oak (*Quercus virginiana*), dahoon holly (*Ilex cassine*), cabbage palm (*Sabal palmetto*), red maple (*Acer rubrum*), cypress (*Taxodium distichum*), and Carolina willow (*Salix caroliniana*). Planted shrubs in this area included wax myrtle (*Myrica cerifera*), buttonbush (*Cephalanthus occidentalis*) and beautyberry (*Callicarpa americana*). The western end of Transect 1 is located in an area that was planted with upland and transitional species. The eastern end of Transect 1 is located in a lower depressional elevation that was planted primarily with wetland species. Herbaceous species observed on the transect included cordgrass (*Spartina bakeri*), red root (*Licanthes caroliniana*), carpetgrass (*Axonopis affinis*), flat sedge (*Cyperus odoratus*), coinwort (*Centella asiatica*), swamp loosestrife (*Hydrocotyle ranunculoides*), swamp fern

Osprey Cove Fifth Annual Monitoring Report

(*Blechnum serrulatum*), Florida tassel flower (*Emilia fosbergii*), maidencane (*Panicum hemitomon*), smartweed (*Polygonum punctatum*), pickerelweed (*Pontedaria cordata*), arrowhead (*Sagittaria lancifolia*), blue flag iris (*Iris virginica*), and fireflag (*Thalia geniculata*). Planted species observed at Photo Station #1A (new in the 2014 report) and Photo Station #2 included primarily cypress, red maple, buttonbush and most of the herbaceous wetland species listed above. Water levels were much higher this year than previously observed. The soils were saturated at Photo Station #1. Photo station #1A had approximately 10" of standing water present and there was approximately 18" of standing water at Photo station #2.

TRANSECT 2 traverses the wetland portion of the large western preserve in a general north to south orientation. The entire length of this monitoring transect is also within an area that was mechanically cleared during exotic vegetation removal activities. This transect begins in a shallow forested wetland system and terminates at the edge of the deeper pond near a mature cypress wetland. The cypress trees in this section of the preserve tower over the trees throughout the remainder of the conservation area, but the planted trees are beginning to show significant growth and many have reached small canopy size.

Plantings along the length of this transect consisted primarily of cypress, red maple, cabbage palm, wax myrtle, and buttonbush. Herbaceous species including maidencane, smartweed, flatsedge, hairgrass (*Eleocharis baldwinii*), foxtail (*Setaria parvillora*), swamp fern, and frog fruit (*Phyla nodiflora*) were scattered throughout the general area along this transect. Red ludwigia (*Ludwigia repens*), fragrant water lily (*Nuphar lutea*), and floating heart (*Nymphoides aquatica*) were abundant in the deeper pond at the southern end of the transect. Overall, the majority of planted trees, shrubs and herbaceous species are thriving and well established throughout the preserved system. The trees have trunks varying from 4-7 inches or more in diameter depending upon species. The shrubs have become well established and are beginning to reproduce. Many of these planted shrub species have naturally recruited into other areas of the preserve. Herbaceous wetland species are also thriving and had established a vegetative cover of nearly 100% in most areas observed during the previous monitoring inspection.

Water depth varied along this transect from 10" near Photo Station #3 to 33" near Photo Station #4. There was standing water along the entire length of this monitoring transect at the time of inspection. Numerous fish species as well as crayfish and apple snails (eggs) were also observed throughout the wetland habitat.

TRANSECT 3 is located within the upland preserve along the southwestern edge of the property, immediately north of Estero Parkway. This area was also heavily invaded by *Melaleuca* prior to the initial exotic removal activities. A majority of this habitat had exotics removed by hand to preserve the existing vegetation to the greatest extent practical. The presence of two inactive gopher tortoise (*Gopherus polyphemus*) burrows was a factor in the mandated hand removal of exotic vegetation within this conservation area. Although no tortoises were actually observed on site, exotic removal was limited to hand clearing to ensure no tortoises were harmed during initial site clearing activities.

areas were all replanted and have been maintained to meet the County's indigenous habitat requirements for this development.

3.1 INDIGENOUS HABITAT RESTORATION AREA A

Indigenous Habitat Restoration Area A is located on the far eastern edge of the property in the southern corner abutting the railroad right-of-way. This indigenous habitat was replanted with slash pine, cabbage palm, live oak, dahoon holly, Carolina willow, and bald cypress as future canopy species. Wax myrtle, coco-plum, saltbush, and beautyberry were planted as shrubs for this habitat. Sand cordgrass, Gulf muhly grass, three-awn grass (*Aristida stricta*), red root, black-eyed Susan (*Rudbeckia hirta*), and beach dune sunflower (*Helianthus debilis*) were planted as the groundcover species throughout this general area. A significant number of the original plantings have survived and the plant species listed above are also represented in the areas where plantings were installed. The wax myrtle has already begun to seed and naturally spread throughout the general area. Saltbush has also increased in abundance throughout this indigenous area and within the adjacent upland preserve habitat. Native rusty lyonia and saw palmetto has naturally recruited into this general area. The groundcover in this area accounts for approximately 80% of the cover.

3.2 INDIGENOUS HABITAT RESTORATION AREA B

Indigenous Habitat Restoration Area B is an irregular shaped habitat located south of a parking lot in the southeastern corner of the development. The eastern edge of this preserve abuts the railroad right-of-way that forms the eastern property line. This area was planted with slash pine, cabbage palm, dahoon holly, and live oak as the canopy species. Saltbush, wax myrtle, beautyberry, and saw palmetto were the planted shrub species. Groundcover species planted included sand cordgrass, three-awn grass, Gulf muhly grass, and swamp fern. Naturally recruited groundcover species include begger-tick, broomsedge (*Andropogon virginicus*), and carpetweed (*Mollugo verticillata*).

3.3 INDIGENOUS HABITAT RESTORATION AREA C

This linear indigenous area is located west of the surface water management pond behind the southernmost building within the development. Area C lies between the pond and the large wetland preserve. Slash pine, live oak, dahoon holly, cabbage palm, and seagrape (*Coccoloba uvifera*) comprised the canopy plantings in this indigenous habitat. Myrsine (*Rapanea punctata*), wax myrtle, saw palmetto, and beautyberry were the shrub plantings originally installed throughout this habitat. Gulf muhly grass, beach dune sunflower, railroad vine (*Ipomoea pes-carpe*), three-awn grass, and sand cordgrass were the herbaceous plantings installed in this area. A dominance of the planted material has survived and is thriving. The area is densely vegetated and very little open ground remains except under the dense tree canopy that has formed in this habitat.

3.4 INDIGENOUS HABITAT RESTORATION AREA D

The last of the indigenous habitats preserved on site is located in the northeastern corner of the property. This small triangular-shaped area was also replanted to establish a native forested habitat. Live oak, slash pine, and cabbage palm were the canopy species

Osprey Cove Fifth Annual Monitoring Report

planted. Myrsine, saw palmetto, wax myrtle, and beautyberry were planted as shrubs. Groundcover species planted included sand cordgrass, Gulf muhly grass, beach dune sunflower, railroad vine, and three-awn grass. A dominance of the planted trees and shrubs has survived and are thriving. Some of the groundcover species have been replaced by broomsedge, carpetgrass and various sedges. The habitat is dominated by native plant species, as required in the development order.

Documentary photographs of indigenous habitat areas are included at the end of this report. Photos were taken in approximately the same location as the previous monitoring reports with the exception of Indigenous Habitat Restoration Area A. This photo station has been moved slightly from the original location on the east side of the habitat and is now located on the southern edge of the habitat. This photo station change was due to the dense vegetation in the original location, making useful photographs nearly impossible at the old location.

4. Results and Discussion

The vegetative data and observations made along each monitoring transect were recorded in Tables 1, 2 and 3 for each corresponding transect within the Osprey Cove mitigation and habitat preservation areas. Species observed information as well as percent cover by species is included in each table.

In general, the nuisance and exotic vegetation that had re-established sporadically throughout the preserves has been controlled and has nearly been eradicated. A recent exotic maintenance treatment event was being completed in early October. The nuisance and exotic vegetation that had become established during the years when no maintenance had been performed has been controlled and is in the process of being eradicated. Due to the extensive seed source offsite and the nearly year round presence of standing water, the control of the exotics has been extremely difficult, but it is progressing significantly. More of the mature plants have been eliminated and seedling / sapling treatment is the primary focus in the ongoing treatments. Now that the adjacent property to the west has been developed, the potential for exotic invasion and seed source has been reduced. With regularly scheduled exotic maintenance events scheduled for this preserve, the nuisance and exotic vegetation within the preserved habitats should be eradicated.

Overall, the preservation areas are healthy and are in excellent condition and water levels were noticeably higher than during the last monitoring inspection. The planted tree and shrub species experienced a very high survival rate and have also shown considerable growth. Most of the tree and shrub plantings exceeded 90% survival from the initial plantings. In addition, the once sparsely vegetated ground cover is now experiencing nearly 100% coverage with desirable native wetland species throughout monitored habitats. Many of the tree plantings are now large enough to be considered canopy-sized trees. The preserves are healthy and continue to function as uplands or wetlands, as intended. The planted shrub species are also enjoying a very high survival rate and have become well established; many are naturally reproducing throughout the

Osprey Cove Fifth Annual Monitoring Report

preserved wetland and indigenous habitats. The planted herbaceous species have achieved a very high survival rate and are healthy and thriving. Sand cordgrass is abundant throughout the preserves as is Gulf muhly grass. Other native grasses have naturally recruited into these preserved habitats and have helped establish a dense groundcover throughout. One notable difference this year is the abundance of arrowhead (*Sagittaria lancifolia*), pickerelweed (*Pontedaria cordata*) and fire flag (*Thalia geniculata*) which have become densely established in areas where standing water is 8" or more in depth. The water depth throughout the site was noticeably deeper than observed previously. Above average rainfall during the summer, coupled with the increased runoff from the now developed Walmart property to the west is likely responsible for the higher water levels and significant increase in submerged species becoming established.

The preserved conservation lands within the Osprey Cove Development have met the conditions for success as detailed in the environmental special conditions of the regulatory permits. That being said, this is the final required monitoring report. On behalf of the client, we are requesting final agency sign-off for these monitored preserve habitats.

Osprey Cove
Fifth Annual Monitoring Report

Table 1 - Transect #1 Vegetative Data

SURVIVAL TOTALS							
Scientific Name	Common Name	Time Zero	1st Annual	2nd Annual	3rd Annual	4th Annual	5th Annual
<i>Sabal palmetto</i>	Cabbage Palm	1	1	1	1	1	1
<i>Pinus elliottii</i>	Slash Pine	3	3	3	3	3	3
<i>Quercus virginiana</i>	Live Oak	3	2	3	3	3	3
<i>Salix caroliniana</i>	Carolina Willow	1	1	1	1	3	7
<i>Acer rubrum</i>	Red Maple	7	6	7	7	7	6
<i>Taxodium distichum</i>	Bald Cypress	17	17	16	16	16	16
<i>Myrica cerifera</i>	Wax Myrtle	38	38	41	38	45+	45+
<i>Cephalanthus occidentalis</i>	Buttonbush	13	13	13	13	15	15
PERCENT COVERAGE							
Scientific Name	Common Name	Time Zero	1st Annual	2nd Annual	3rd Annual	4th Annual	5th Annual
<i>Sabal palmetto</i>	Cabbage Palm	-	-	-	3%	4%	5%
<i>Pinus elliottii</i>	Slash Pine	-	-	-	4%	5%	5%
<i>Quercus virginiana</i>	Live Oak	-	-	-	7%	7%	9%
<i>Salix caroliniana</i>	Carolina Willow	-	-	-	2%	3%	8%
<i>Acer rubrum</i>	Red Maple	-	-	-	2%	4%	5%
<i>Taxodium distichum</i>	Bald Cypress	-	-	-	10%	12%	12%
<i>Myrica cerifera</i>	Wax Myrtle	-	-	-	7%	8%	10%
<i>Cephalanthus occidentalis</i>	Buttonbush	-	-	-	15%	15%	15%
<i>Callicarpa americana</i>	Beautyberry	-	-	-	0.5%	1%	0.5%
<i>Baccharis halimifolia</i>	Saltbush	-	-	-	1%	1%	1%
<i>Ludwigia octovalis</i>	Water Primrose	-	-	-	0.5%	0.5%	0.5%
<i>Ludwigia peruviana</i>	Primrose Willow	-	-	-	0.5%	0.5%	0.5%
<i>Polygonum punctatum</i>	Dotted Smartweed	-	-	-	5%	8%	10%
<i>Pontedaria cordata</i>	Pickernelweed	-	-	-	5%	8%	10%
<i>Sagittaria lancifolia</i>	Arrowhead	-	-	-	4%	8%	10%
<i>Phyla nodiflora</i>	Frog Fruit	-	-	-	6%	3%	5%
<i>Spartina bakeri</i>	Sand Cordgrass	-	-	-	8%	4%	4%
<i>Axonopus affinis</i>	Carpet Grass	-	-	-	3%	2%	2%

Table 2 - Transect #2 Vegetative Data

SURVIVAL TOTALS							
Scientific Name	Common Name	Time Zero	1 st Annual	2 nd Annual	3 rd Annual	4 th Annual	5 th Annual
<i>Sabal palmetto</i>	Cabbage Palm	-	-	-	1	1	1
<i>Pinus elliottii</i>	Slash Pine	-	-	-	-	-	-
<i>Quercus virginiana</i>	Live Oak	-	-	-	1	1	1
<i>Salix caroliniana</i>	Carolina Willow	-	-	-	1	2	2
<i>Acer rubrum</i>	Red Maple	4	4	4	4	4	4
<i>Taxodium distichum</i>	Bald Cypress	10	10	10	10	10	10
<i>Myrica cerifera</i>	Wax Myrtle	16	16	17	17	19	20+
<i>Cephalanthus occidentalis</i>	Buttonbush	26	26	27	27	28	30+
PERCENT COVERAGE							
Scientific Name	Common Name	Time Zero	1 st Annual	2 nd Annual	3 rd Annual	4 th Annual	5 th Annual
<i>Sabal palmetto</i>	Cabbage Palm	-	-	-	1%	1%	1%
<i>Pinus elliottii</i>	Slash Pine	-	-	-	2%	2%	3%
<i>Quercus virginiana</i>	Live Oak	-	-	-	2%	2%	4%
<i>Salix caroliniana</i>	Carolina Willow	-	-	-	4%	6%	8%
<i>Acer rubrum</i>	Red Maple	-	-	-	5%	7%	8%
<i>Taxodium distichum</i>	Bald Cypress	-	-	-	12%	13%	15%
<i>Myrica cerifera</i>	Wax Myrtle	-	-	-	4%	5%	7%
<i>Cephalanthus occidentalis</i>	Buttonbush	-	-	-	3%	5%	7%
<i>Callicarpa americana</i>	Beautyberry	-	-	-	0.5%	0.5%	0.5%
<i>Baccharis halimifolia</i>	Saltbush	-	-	-	0.5%	0.5%	0.5%
<i>Ludwigia octovalis</i>	Water Primrose	-	-	-	1%	1%	0.5%
<i>Ludwigia peruviana</i>	Primrose Willow	-	-	-	0.5%	0.5%	0.5%
<i>Polygonum punctatum</i>	Dotted Smartweed	-	-	-	4%	8%	10%
<i>Pontedaria cordata</i>	Pickernelweed	-	-	-	6%	8%	10%
<i>Sagittaria lancifolia</i>	Arrowhead	-	-	-	3.5%	8%	10%
<i>Phylla nodiflora</i>	Frog Fruit	-	-	-	3%	2%	5%

Osprey Cove
Fifth Annual Monitoring Report

CONTINUED: Table 2 - Transect #2 Vegetative Data

<i>Spartina bakeri</i>	Sand Cordgrass	-	-	-	5%	3%	3%
<i>Axonopus affinis</i>	Carpet Grass	-	-	-	3.5%	2%	2%
<i>Licanthes carolinianus</i>	Red Root	-	-	-	0.5%	0.5%	0.5%
<i>Andropogon glomeratus</i>	Bushy Broomgrass	-	-	-	2%	1%	1%
<i>Andropogon virginicus</i>	Broomsedge	-	-	-	0.5%	0.5%	0.5%
<i>Thalia geniculata</i>	Fire Flag	-	-	-	4.5%	8%	15%
<i>Mikania scandens</i>	Hempvine	-	-	-	1%	0.5%	0.5%
<i>Pluchea odorata</i>	Marsh Fleabane	-	-	-	0.5%	0.5%	0.5%
<i>Panicum hemitomon</i>	Maidencane	-	-	-	3%	5%	7%
<i>Blechnum serrulatum</i>	Swamp Fern	-	-	-	4.5%	5%	8%
<i>Bohemia cylindrica</i>	False Nettle	-	-	-	0.5%	1%	1%
<i>Muhlenbergia capillaris</i>	Gulf Muhly Grass	-	-	-	0.5%	0.5%	0.5%
<i>Nuphar lutea</i>	Fragrant Water Lily	-	-	-	0.5%	1%	2%
<i>Bacopa caroliniana</i>	Lemon Bacopa	-	-	-	1.5%	2%	4%
<i>Ludwigia repens</i>	Red Ludwigia	-	-	-	1%	3%	
<i>Rhynchospora microcarpa</i>	Small-Fruited Beakrush	-	-	-	0.5%	0.5%	0.5%
<i>Iris virginica</i>	Blue Flag Iris	-	-	-	0.5%	0.5%	0.5%
<i>Cyperus odoratus</i>	Sedge	-	-	-	1.5%	1%	1%
<i>Cyperus haspan</i>	Flat Sedge	-	-	-	1%	1%	1%
<i>Ipomoea purpurea</i>	Morning Glory	-	-	-	0.5%	0.5%	0.5%
<i>Setaria geniculata</i>	Fox Tail	-	-	-	1%	0.5%	0.5%
<i>Centella asiatica</i>	Coinwort	-	-	-	2.5%	2%	3%
<i>Hydrocotyle ranunculoides</i>	Swamp Loosestrife	-	-	-	3%	2%	3%
<i>Toxicodendron radicans</i>	Poison Ivy	-	-	-	0.5%	0.5%	-
<i>Senna pendula</i>	Climbing Cassia	-	-	-	0.5%	0.5%	0.5%

Osprey Cove
Fifth Annual Monitoring Report

Table 3 - Transect #3 Vegetative Data

SURVIVAL TOTALS							
Scientific Name	Common Name	Time Zero	1 st Annual	2 nd Annual	3 rd Annual	4 th Annual	5 th Annual
<i>Sabal palmetto</i>	Cabbage Palm	3	3	2	2	2	2
<i>Pinus elliottii</i>	Slash Pine	8	8	8	8	8	8
<i>Quercus virginiana</i>	Live Oak	2	2	2	2	2	2
<i>Ilex cassine</i>	Dahoon Holly	4	3	2	2	2	2
<i>Chrysobalanus iacoco</i>	Coco-plum	21	21	19	17	18	18
<i>Taxodium distichum</i>	Bald Cypress	9	9	9	9	10	10
PERCENT COVERAGE							
Scientific Name	Common Name	Time Zero	1 st Annual	2 nd Annual	3 rd Annual	4 th Annual	5 th Annual
<i>Sabal palmetto</i>	Cabbage Palm	-	-	-	5%	5%	5%
<i>Pinus elliottii</i>	Slash Pine	-	-	-	8%	8%	10%
<i>Quercus virginiana</i>	Live Oak	-	-	-	10%	12%	14%
<i>Ilex cassine</i>	Dahoon Holly	-	-	-	1%	1%	1%
<i>Chrysobalanus iacoco</i>	Coco-plum	-	-	-	3%	4%	7%
<i>Taxodium distichum</i>	Bald Cypress	-	-	-	0.5%	5%	8%
<i>Myrica cerifera</i>	Wax Myrtle	-	-	-	12%	12%	15%
<i>Baccharis halimifolia</i>	Saltbush	-	-	-	8%	5%	5%
<i>Serenoa repens</i>	Saw Palmetto	-	-	-	25%	25%	15%
<i>Callicarpa americana</i>	Beautyberry	-	-	-	1.5%	1.5%	1.5%
<i>Lyonia ferruginea</i>	Rusty Lyonia	-	-	-	3%	5%	8%
<i>Piloblephis rigida</i>	Pennyroyal	-	-	-	2%	3%	3%
<i>Spartina bakeri</i>	Sand Cordgrass	-	-	-	4%	5%	4%
<i>Muhlenbergia capillaris</i>	Gulf Muhly Grass	-	-	-	2%	3%	3%
<i>Aristida stricta</i>	Three-awn Grass	-	-	-	3%	3%	3%
<i>Pteridium aquilinum</i>	Bracken Fern	-	-	-	0.5%	0.5%	0.5%
<i>Amphicarpum muhlenbergianum</i>	Goobergrass	-	-	-	3%	5%	5%
<i>Senna pendula</i>	Climbing Cassia	-	-	-	0.5%	0.5%	0.5%
<i>Rhodomyrtus tomentosa</i>	Downy Rose Myrtle	-	-	-	-	0.5%	10%

5. Monitoring and Maintenance Schedule

Exotic and nuisance vegetation will continue to be treated during scheduled semi-annual maintenance events. The most recent maintenance event was conducted during early October. During the remaining exotic treatments, special attention will be paid to the eradication of climbing cassia and Melaleuca seedlings as well as Brazilian pepper, which seem to be the most persistent exotic plant species that continue to sprout from seed material remaining in the preserves. Undesirable nuisance and exotic plant species will be targeted and treated as encountered during scheduled maintenance events. All chemicals being used are labeled and approved for application in aquatic systems. The herbicide type to be applied to various nuisance and exotic vegetation are as follows:

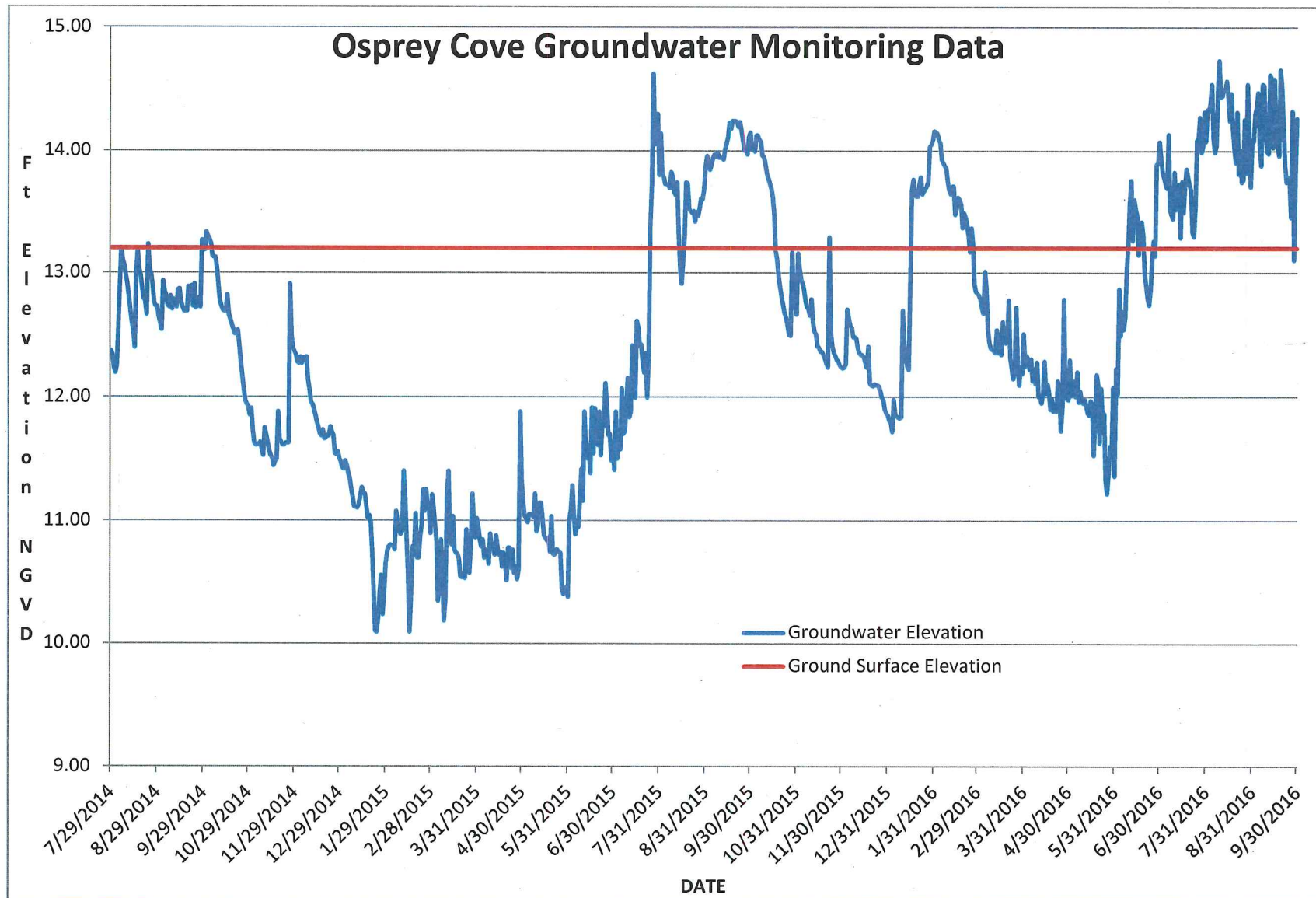
Glyphosate at 2% for graminoid species (i.e. smutgrass, torpedograss and Bermuda grass, etc).

2-4-D at 2% with 1% activate for broadleaf species (i.e. West Indian marsh grass, climbing hempvine, water primrose, ragweed, cattail, dog fennel, etc.)

Garlon 4 at 18.65% for Brazilian pepper, Melaleuca, Earleaf acacia, climbing cassia, and Java plum.

6. Hydrology

A continuous read groundwater well purchased from Remote Data Systems (RDS) was installed in the southeastern corner of the large preserved wetland system on the site. The groundwater well provided daily water table readings within this wetland preserve to verify groundwater levels were adequate to maintain the wetland habitats that have been restored and preserved in this section of the property. A graph showing the current water readings compared to the existing ground surface is included. Readings since the well was installed on July 28, 2014 indicates this area experiencing appropriate wetland hydrology and a sufficient hydroperiod to maintain the wetland system. These observations are made from the limited data available since the well installation. However, the increase in density and cover and survival of FACW and Obligate wetland species is a good indication that water levels within the preserves are adequate to maintain wetland habitat and function in perpetuity.



7. Wildlife Species and Signs Observed

The wildlife species shown in Table 4 below have been observed during monitoring inspections by Stantec ecologists.

Table 4 - Wildlife Observations

BIRDS	
Cardinal	<i>Cardinalis cardinalis</i>
Boat Tailed Grackle	<i>Quiscalus major</i>
Northern Mockingbird	<i>Mimus polyglottos</i>
Red Shouldered Hawk	<i>Buteo lineatus</i>
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>
Mourning Dove	<i>Zenaida macroura</i>
Black Vulture	<i>Coragyps atratus</i>
Little Blue Heron	<i>Egretta caerulea</i>
Great Blue Heron	<i>Ardea herodias</i>
White Ibis	<i>Eudocimus albus</i>
REPTILES	
American Alligator	<i>Alligator mississippiensis</i>
Three Lined Mud Turtle	<i>Kinosternon baurii</i>
Cottonmouth	<i>Agkistrodon piscivorus</i>
MAMMALS	
Armadillo (burrows)	<i>Dasypus novemcinctus</i>
Eastern Cottontail (scat)	<i>Sylvilagus floridanus</i>
Raccoon	<i>Procyon lotor</i>
AMPHIBIANS	
Leopard Frog	<i>Rana sphenoccephala</i>
Spring Peeper	<i>Pseudacris crucifer</i>
Florida Cricket Frog	<i>Acris gryllus dorsalis</i>
CRUSTACEANS	
Crayfish	<i>Procambarus alleni</i>
INVERTEBRATES	
Apple Snail	<i>Pomacea paludosa</i>
FISH	
Mosquitofish	<i>Gambusia affinis</i>
Flag Fish	<i>Jordanella floridae</i>
Sailfin Mollies	<i>Poecilia latipinna</i>

8. Summary

During the monitoring site inspection conducted on September 29, 2016 for the Fifth Annual Monitoring Report, three permanent monitoring transects were inspected within the two on-site preserves. There were a total of ten (10) permanent photo stations established along these transects and at each of the indigenous habitat preserves. In addition, general observations relating to site conditions, wildlife utilization, exotic/nuisance vegetation, and the overall health of the systems monitored were also noted.

Activities scheduled for the preserved wetlands, the preserved uplands and the preserved indigenous habitats include perpetual maintenance to assure the eradication of exotic/nuisance vegetation, and measures to prevent the invasion or re-infestation of exotic/nuisance vegetation.

Percent cover provided by canopy, sub-canopy and groundcover was calculated by identifying each species and estimating a percent coverage of that species along transects established within the monitored habitats. These data are presented in Tables 1-3 within the report. Overall species composition within these preserved habitats is typical for this type of natural habitats throughout this general region.

The perpetual eradication of Florida Exotic Plant Pest Council (FLEPPC) Category I and II exotic plant species will continue to ensure the preserved habitats remain exotic free as required in the permits and development order for Osprey Cove. Well-coordinated timing of maintenance treatments (dry season and active growing periods for the target species) will assure the efficiency of herbicide application, using minimal chemical volume and minimizing the disruption of the diversity of native species within the restored habitats.

9. Monitoring and Maintenance Schedule

The following provides a brief outline of the previously performed monitoring and maintenance and also provides an updated schedule of anticipated maintenance, monitoring and site inspection events for the Osprey Cove Development:

<u>Previously Performed Activities</u>	<u>Completion Date</u>
Initial Exotic Eradication	Completed - 2005
Time Zero Monitoring Report	Completed - 2005
Semi-Annual Exotic Maintenance Event	Completed - 2006
First Annual Monitoring Report	Completed - 2006
Semi-Annual Exotic Maintenance Event	Completed - 2006
Second Annual Monitoring Report	Completed - 2007
 <u>Revised Activity and Due Date</u>	
Exotic Maintenance Event	Completed - August 2014
Third Annual Monitoring Report	Completed - October 2014
Exotic Maintenance Event	Completed - April 2015
Exotic Maintenance Event	Completed - August 2015
Fourth Annual Monitoring Report	Completed - October 2015
Exotic Maintenance Event	Completed - April 2016
Exotic Maintenance Event	Completed - August 2016
Fifth Annual Monitoring Report	This Report - October 2016
SFWMD Final Site Inspection	November 2016

Exhibit 1

Transect Location Map

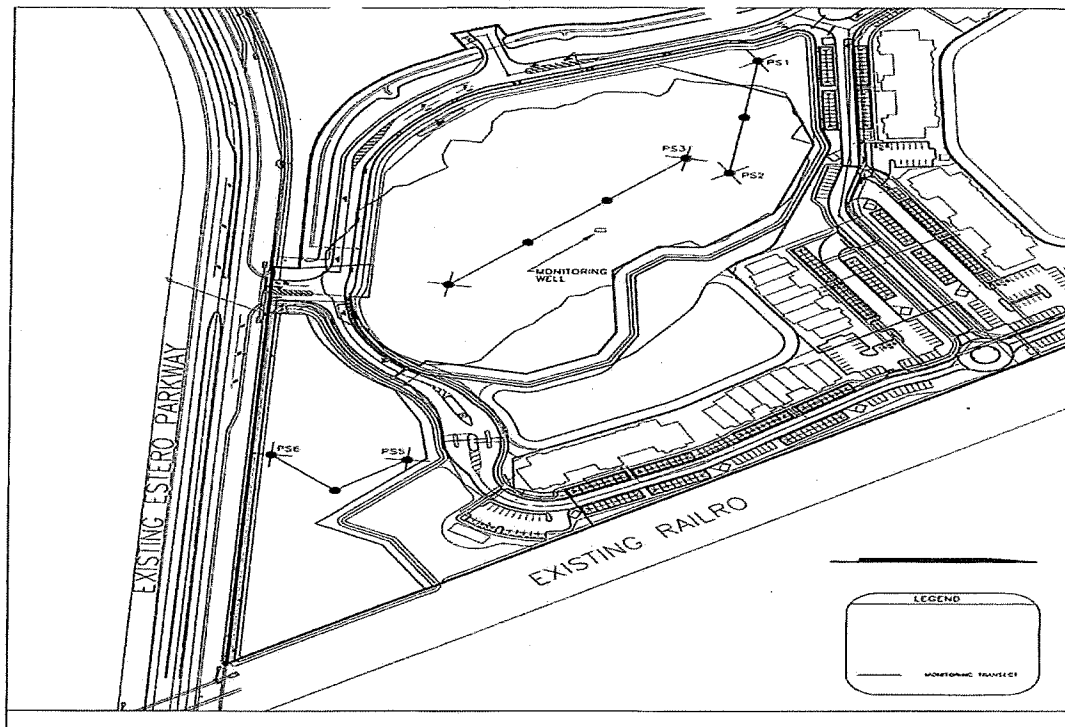
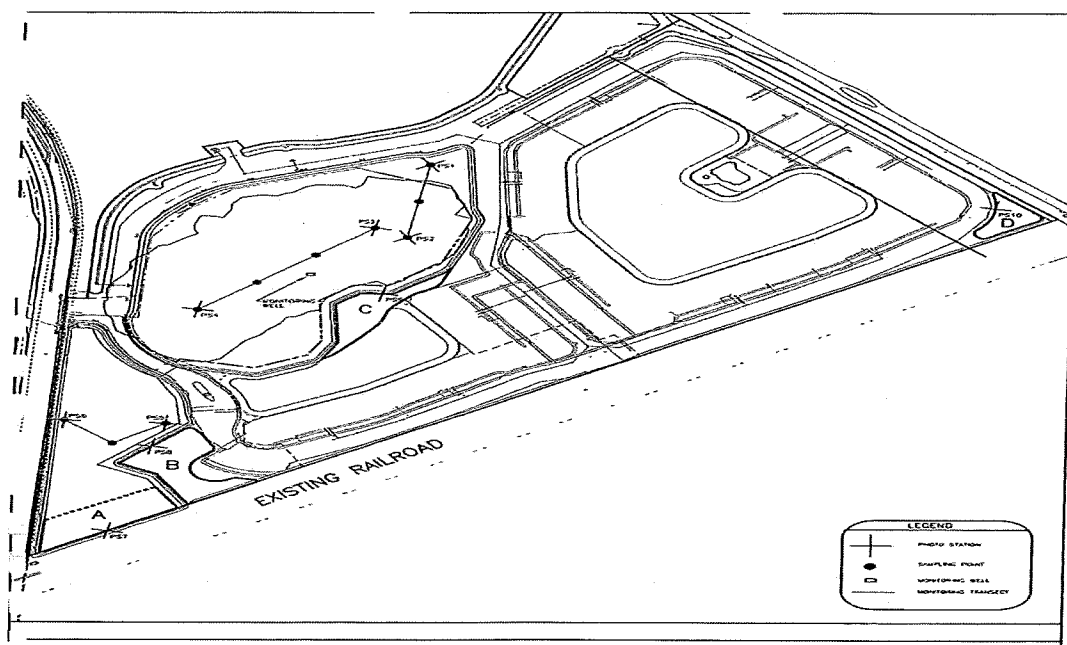


Exhibit 2

Indigenous Preserves and Photo Station Exhibit



Appendix A

Photos Taken from Transect Photo Stations

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Appendix A Pg 1 of 14



Transect #1 - Photo Station #1 – Looking North



Transect #1 - Photo Station #1 – Looking East

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 2 of 14



Transect #1 - Photo Station #1 – Looking South



Transect #1 - Photo Station #1 – Looking West

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 3 of 14



Transect #1 - Photo Station #1A – Looking North



Transect #1 - Photo Station #1A – Looking East

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 4 of 14



Transect #1 - Photo Station #1A – Looking South



Transect #1 - Photo Station #1A – Looking West

**Osprey Cove
Fifth Annual Monitoring Report**

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 5 of 14



Transect #1 - Photo Station #2 – Looking North



Transect #1 - Photo Station #2 – Looking East

**Osprey Cove
Fifth Annual Monitoring Report**

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 6 of 14



Transect #1 - Photo Station #2 – Looking South



Transect #1 - Photo Station #2 – Looking West

**Osprey Cove
Fifth Annual Monitoring Report**

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 7 of 14



Transect #2 - Photo Station #3 – Looking North



Transect #2 - Photo Station #3 – Looking East

**Osprey Cove
Fifth Annual Monitoring Report**

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 8 of 14



Transect #2 - Photo Station #3 – Looking South



Transect #2 - Photo Station #3 – Looking West

**Osprey Cove
Fifth Annual Monitoring Report**

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 9 of 14



Transect #2 - Photo Station #4 – Looking North



Transect #2 - Photo Station #4 – Looking East

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 10 of 14



Transect #2 - Photo Station #4 – Looking South



Transect #2 - Photo Station #4 – Looking West

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 11 of 14



Transect #3 - Photo Station #5 – Looking North



Transect #3 - Photo Station #5 – Looking East

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 12 of 14



Transect #3 - Photo Station #5 – Looking South



Transect #3 - Photo Station #5 – Looking West

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 2016), Page 13 of 14



Transect #3 - Photo Station #6 – Looking North



Transect #3 - Photo Station #6 – Looking East

Osprey Cove
Fifth Annual Monitoring Report

Osprey Cove Transect Photo Stations – Fifth Annual Monitoring Report (September 29, 20116), Page 14 of 14



Transect #3 - Photo Station #6 – Looking South



Transect #3 - Photo Station #6 – Looking West

Appendix B
Photos Taken from Indigenous Habitat Photo Station



Photo Station #7 – Indigenous Area A - Looking West (New photo location from original reports)



Photo Station #8 – Indigenous Area B – Looking East



Photo Station #9 – Indigenous Area C - Looking Southwest



Photo Station #9 – Indigenous Area C - Looking Northwest



Photo Station #10 – Indigenous Preserve D – (North half of preserve) - Looking Northeast



Photo Station #10 – Indigenous Preserve D – (South half of preserve) - Looking Southeast