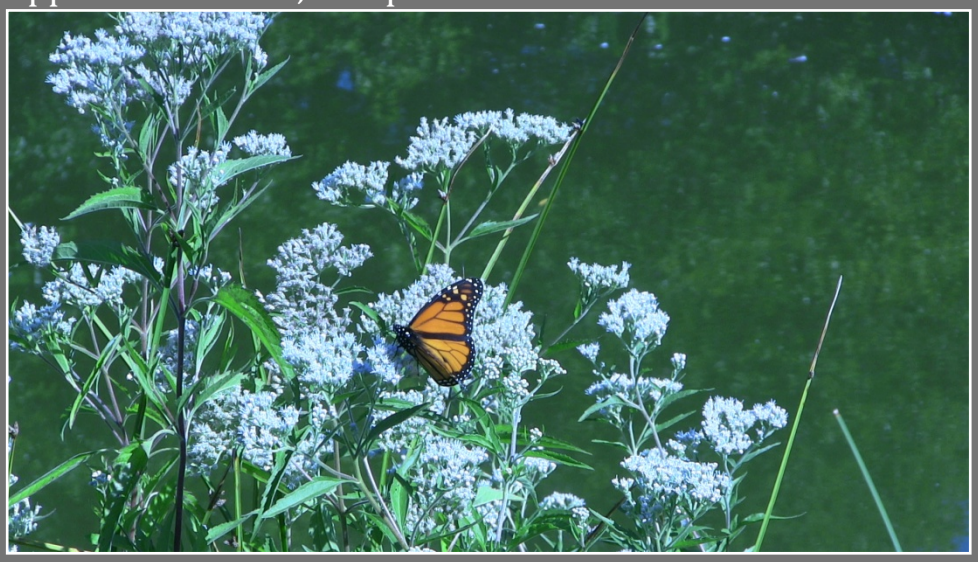
2015

Jeorse Park Section 506 Great Lakes Fishery & Ecosystem Restoration Study

Appendix A – Data, Compliance and Coordination



USACE
Chicago District
August 2015

APPENDIX A – Data, Compliance and Coordination

September 2015

Table of Contents

HABITAT BENEFIT CALCULATIONS……..……1
EXISTING CONDITIONS FQI……...…..3
FUTURE W/ PROJECT CONDITIONS FQI……....5
FISH SPECIES RICHNESS AND HABITAT ASSESSMENT……10
HABITAT SUITABILITY INDEX …….…….11
CORRESPONDENCE ……...….13
COMPLIANCE…….30
404(B)1……...31
USFWS LISTED SPECIES……39
DRAFT FINDING OF NO SIGNIFICANT IMPACT (FONSI).....42
COST EFFECTIVENESS & INCREMENTAL COST ANALYSIS…….…..43
TOTAL AND AVERAGE COST TABLE OF ALTERNATIVE PLANS……44

Habitat Benefit Calculations

The evaluation of habitat benefits is a comparison of the with-project and without-project conditions for each restoration measure per habitat type and is accounted for in terms of habitat units (HU's). HU's are calculated by multiplying a calculated habitat suitability index (HSI) by the number of acres affected by the measure being evaluated. HSIs for this study were evaluated using the Mean C of the Chicago Region Floristic Quality Assessment (FQA) methodology and fish species richness based off current and historical survey records for southern Lake Michigan.

The Floristic Quality Assessment (FQA) is based on the Chicago Region's floristic coefficients of conservatism developed by Swink and Wilhelm[1] and was approved for regional use by the USACE Ecosystem Planning Center of Expertise (ECO-PCX). The FQA was designed for use as an all inclusive method, not just a method to identify high quality sites. This method has been extensively studied and shows great promise as a quick and easily understood method of assessing the quality of plant communities in any situation, either urban or an undisturbed remnant setting. Baseline floristic quality was surveyed in the spring of 2014, which will serve as a comparison for predictions of changes to the plant community based on alternative future scenarios. Based on the species inventory, the FQA generates two essential metrics: the Mean C (coefficient of conservatism), which is the average coefficient of conservatism for a site, and the Floristic Quality Index (FQI), which is derived by multiplying Mean C by the square root of the number of native species inventoried. Based on statistical analysis of previous studies, the FQI shows a significant positive relationship to species richness[2] and as such the Mean C value represents the more comparable and accurate metric.

Lacustrine habitat restoration benefits are measured through fish species richness (R), which is the total number of fish species. An assessment was done utilizing the Fishes of the Chicago Region database, which is primarily comprised of fish collection vouchers from multiple sources including the Chicago Field Museum of Natural History and the Illinois Natural History Survey from 1878 - 2005. Thirty six sampling records were queried over forty three miles of southern Lake Michigan shoreline which included all of the Lake County coastline and portions of Cook and Porter Counties to the east and west.

The FQA mean C and fish species richness were used to calculate the HSI using the following methods:

- Beach and Dune Restoration HSI = Mean C
- Lacustrine Restoration = R/4.9

For terrestrial restoration activities at the beach and dunes, each native plant species has been assigned a coefficient of conservatism (C), ranging from 0 to 10. A 0 is assigned to species that are highly tolerant to disturbance and are considered general in their habitat distribution and a 10 is assigned to species with a very low tolerance to disturbance and displays a very specific relationship to a certain habitat type. The mean C provides a comparable and accurate metric for quantifying changes (beneficial or detrimental) to the existing resources and is utilized as the habitat suitability index for the terrestrial restoration measure of success. The lacustrine restoration activities will utilize native fish species richness in calculating the HSI. In order to keep the scale of R comparable to that of mean C, the HSI for lacustrine restoration will take the calculated R and divide it by one tenth of the total number of projected fish species able to use the project area. Since there are 49 species present within the vicinity of the project area capable of utilizing habitat at Jeorse Park Beach, the HSI will be equal to R/4.9.

[1] Swink and Wilhelm, 1979
[2] Ervin et al., 2006

This section includes calculations and surveys which support the habitat unit values presented in the main report. The included information is outlined here:

Existing Conditions FQI and mean C includes the survey of existing plant species at the Jeorse Park Beach project site. Each species was assigned a value for the coefficient of conservatism and used to calculate the mean C and FQI. These values were calculated for the breakwater and the beach and dune habitats separately.

Future with Project Conditions FQI and mean C include the planting list of new species that will be introduced and those species on site that will be retained. This future with project species list omits the adventives and non-native species that are planned for removal per the invasive species plant removal measure. This new species list was then used within the FQA to calculate FQI and mean C values. These values were calculated for the breakwater and the beach and dune habitats separately.

Fish Species Richness and Habitat Assessment include review of historical fish species present within the surrounding area of Jeorse Park Beach along with information from recent fisheries surveys taken by Chicago District staff. This data was used to prepare a table of fish species that could be present within the project area. This list of species was then used to determine which species could benefit from the restoration measures proposed to help determine the possible future with project species richness. Species richness was then used to calculate the HSI and HUs for each of the project measures affecting lacustrine habitat; rock reef, breakwater plantings and breakwater modification.

Habitat Suitability Index includes the calculated HSIs for the existing conditions including a forecast of future without project conditions as well as future with project conditions as measured in previous sections. These values were projected for the fifty year project life and account for how the ecosystem will change over time.

SITE: Jeorse Park
LOCALE: Breakwater
BY: Robbie Sliwinski
NOTES: Existing Conditions

CONSERVATISM-BASED METRICS			ADDITIONAL METRICS	
MEAN C (NATIVE SPECIES)		0.50	SPECIES RICHNESS (ALL)	6
MEAN C (ALL SPECIES)		0.17	SPECIES RICHNESS (NATIVE)	2
MEAN C (NATIVE TREES)	n/a		% NON-NATIVE	0.67
MEAN C (NATIVE SHRUBS)	n/a		WET INDICATOR (ALL)	1.33
MEAN C (NATIVE HERBACEOUS)		0.50	WET INDICATOR (NATIVE)	1.50
FQAI (NATIVE SPECIES)		0.71	% HYDROPHYTE (MIDWEST)	0.17
FQAI (ALL SPECIES)		0.41	% NATIVE PERENNIAL	0.00
ADJUSTED FQAI		2.89	% NATIVE ANNUAL	0.17
% C VALUE 0		0.83	% ANNUAL	0.50
% C VALUE 1-3		0.17	% PERENNIAL	0.17
% C VALUE 4-6		0.00		
% C VALUE 7-10		0.00		

SPECIES ACRONYM	SPECIES NAME (NWPL/ MOHLENBROCK)	SPECIES (SYNONYM)	COMMON NAME	C VALUE	MIDWEST WET INDICATOR	WET INDICATOR (NUMERIC)	HABIT	DURATION	NATIVITY
brotec	Bromus tectorum	BROMUS TECTORUM	Downy Chess	0	UPL	2	Grass	Annual	Adventive
dipmur	Diplotaxis muralis	DIPLOTAXIS MURALIS	Wall Rocket	0	UPL	2	Forb	Annual	Adventive
lacser	Lactuca serriola	LACTUCA SERRIOLA	Prickly Lettuce	0	FACU	1	Forb	Biennial	Adventive
oenbie	Oenothera biennis	Oenothera biennis	King's-Cureall	0	FACU	1	Forb	Biennial	Native
poapra	Poa pratensis	POA PRATENSIS	Kentucky Blue Grass	0	FAC	0	Grass	Perennial	Adventive
silant	Silene antirrhina	Silene antirrhina	Sleepy Catchfly	1	UPL	2	Forb	Annual	Native

SITE: Jeorse Park
LOCALE: Dune & Beach
BY: Robbie Sliwinski
NOTES: Existing Conditions

CONSERVATISM-BASED METRICS	
MEAN C (NATIVE SPECIES)	2.81
MEAN C (ALL SPECIES)	1.35
MEAN C (NATIVE TREES)	1.67
MEAN C (NATIVE SHRUBS)	1.00
MEAN C (NATIVE HERBACEOUS)	3.10
FQAI (NATIVE SPECIES)	14.32
FQAI (ALL SPECIES)	9.93
ADJUSTED FQAI	19.48
% C VALUE 0	0.65
% C VALUE 1-3	0.17
% C VALUE 4-6	0.13
% C VALUE 7-10	0.06

ADDITIONAL METRICS	
SPECIES RICHNESS (ALL)	54
SPECIES RICHNESS (NATIVE)	26
% NON-NATIVE	0.52
WET INDICATOR (ALL)	0.80
WET INDICATOR (NATIVE)	0.69
% HYDROPHYTE (MIDWEST)	0.30
% NATIVE PERENNIAL	0.31
% NATIVE ANNUA	0.13
% ANNUAL	0.26
% PERENNIAL	0.63

SPECIES ACRONYM	SPECIES NAME (NWPL/MOHLENBROCK)	COMMON NAME	C VALUE	MIDWEST WET INDICATOR	WET INDICATOR (NUMERIC)	HABIT	DURATION	NATIVITY
achmil	Achillea millefolium	Common Yarrow	0	FACU	1	Forb	Perennial	Adventive
ailalt	Ailanthus altissima	Tree-of-Heaven	0	FACU	1	Tree	Perennial	Adventive
ammbre	Ammophila breviligulata	Beach Grass	7	UPL	2	Grass	Perennial	Native
artcau	Artemisia caudata	Beach Wormwood	5	UPL	2	Forb	Biennial	Native
artvul	Artemisia vulgaris	Common Mugwort	0	UPL	2	Forb	Perennial	Adventive
ascsyr	Asclepias syriaca	Common Milkweed	0	FACU	1	Forb	Perennial	Native
broine	Bromus inermis	Smooth Brome	0	FACU	1	Grass	Perennial	Adventive
brotec	Bromus tectorum	Downy Chess	0	UPL	2	Grass	Annual	Adventive
cakede	Cakile edentula	American Searocket	9	FACU	1	Forb	Annual	Native
callon	Calamovilfa longifolia	Sand Reed	5	UPL	2	Grass	Perennial	Native
carpar	Cardamine parviflora var. arenicola	Small-Flowered Bitter Cress	2	FAC	0	Forb	Annual	Native
cerfon	Cerastium fontanum	Common Mouse-Ear Chickweed	0	FACU	1	Forb	Perennial	Adventive
cirarv	Cirsium arvense	Canadian Thistle	0	FACU	1	Forb	Perennial	Adventive
cirvul	Cirsium vulgare	Bull Thistle	0	FACU	1	Forb	Biennial	Adventive
corhys	Corispermum hyssopifolium	American Bugseed	5	FACU	1	Forb	Annual	Native
cycatr	Cycloloma atriplicifolium	Winged Pigweed	7	UPL	2	Forb	Annual	Native
dipmur	Diplotaxis muralis	Wall Rocket	0	UPL	2	Forb	Annual	Adventive
elaang	Elaeagnus angustifolia	Russian-Olive	0	FACU	1	Shrub	Perennial	Adventive
equhye	Equisetum hyemale	Tall Scouring-Rush	3	FACW	-1	Fern	Perennial	Native
eupalt	Eupatorium altissimum	Tall Boneset	0	UPL	2	Forb	Perennial	Native
eupser	Eupatorium serotinum	Late-Flowering Thoroughwort	0	FAC	0	Forb	Perennial	Native
fraaln	Frangula alnus	Glossy False Buckthorn	0	FACW	-1	Shrub	Perennial	Adventive
frapen	Fraxinus pennsylvanica	Green Ash	1	FACW	-1	Tree	Perennial	Native
gletri	Gleditsia triacanthos	Honey-Locust	2	FACU	1	Tree	Perennial	Native
lacser	Lactuca serriola	Prickly Lettuce	0	FACU	1	Forb	Biennial	Adventive

SITE: Jeorse Park
LOCALE: Breakwater
BY: Robbie Sliwinski
NOTES: Future with project

CONSERVATISM-BASED METRICS				ADDITIONAL METRICS	
MEAN C (NATIVE SPECIES)		7.56	SPECIES RICHNESS (ALL)		16
MEAN C (ALL SPECIES)		7.56	SPECIES RICHNESS (NATIVE)		16
MEAN C (NATIVE TREES)	n/a		% NON-NATIVE		0.00
MEAN C (NATIVE SHRUBS)		8.64	WET INDICATOR (ALL)		1.06
MEAN C (NATIVE HERBACEOUS)		5.50	WET INDICATOR (NATIVE)		1.06
FQAI (NATIVE SPECIES)		30.25	% HYDROPHYTE (MIDWEST)		0.31
FQAI (ALL SPECIES)		30.25	% NATIVE PERENNIAL		0.94
ADJUSTED FQAI		75.63	% NATIVE ANNUAL		0.00
% C VALUE 0		0.00	% ANNUAL		0.00
% C VALUE 1-3		0.00	% PERENNIAL		0.94
% C VALUE 4-6		0.38			
% C VALUE 7-10		0.63			

SPECIES ACRONYM	SPECIES NAME (NWPL/ MOHLENBROCK)	SPECIES (SYNONYM)	COMMON NAME	C VALUE	MIDWEST WET INDICATOR	WET INDICATOR (NUMERIC)	HABIT	DURATION	NATIVITY
ammbre	Ammophila breviligulata	Ammophila breviligulata	Beach Grass	7	UPL	2	Grass	Perennial	Native
artcau	Artemisia caudata	Artemisia caudata	Beach Wormwood	5	UPL	2	Forb	Biennial	Native
callon	Calamovilfa longifolia	Calamovilfa longifolia magna	Sand Reed	5	UPL	2	Grass	Perennial	Native
ceaher	Ceanothus herbaceus	Ceanothus herbaceus	Inland New Jersey Tea	10	UPL	2	Shrub	Perennial	Native
celsca	Celastrus scandens	Celastrus scandens	American Bittersweet	4	FACU	1	Vine	Perennial	Native
corsto	Cornus alba	Cornus stolonifera	Red Osier	6	FACW	-1	Shrub	Perennial	Native
hudtom	Hudsonia tomentosa	Hudsonia tomentosa	False Heather	10	UPL	2	Shrub	Perennial	Native
hypkal	Hypericum kalmianum	Hypericum kalmianum	Kalm's St. John's-Wort	10	FACW	-1	Shrub	Perennial	Native
juncom	Juniperus communis	Juniperus communis	Common Juniper	10	UPL	2	Shrub	Perennial	Native
junhor	Juniperus horizontalis	Juniperus horizontalis	Creeping Juniper	10	FACU	1	Shrub	Perennial	Native
smiste	Maianthemum stellatum	Smilacina stellata	Starry False Solomon's-Seal	5	FAC	0	Forb	Perennial	Native
opuhum	Opuntia humifusa	Opuntia humifusa	Common Prickly-Pear	5	UPL	2	Shrub	Perennial	Native
prupum	Prunus pumila	Prunus pumila	Great Lakes Sand Cherry	8	UPL	2	Shrub	Perennial	Native
rhuaroe	Rhus aromatica var. arenaria	Rhus aromatica arenaria	Fragrant Sumac	9	UPL	2	Shrub	Perennial	Native
salcor	Salix cordata	Salix syrticola	Heart-Leaf Willow	10	FAC	0	Shrub	Perennial	Native
salgla	Salix myricoides	Salix glaucophylloides	Bayberry Willow	7	FACW	-1	Shrub	Perennial	Native

lepvir	Lepidium virginicum	Poorman's-Pepperwort	0	FACU	1	Forb	Annual	Native
elyare	Leymus arenarius	European Lyme Grass	0	FACU	1	Grass	Perennial	Adventive
smiste	Maianthemum stellatum	Starry False Solomon's-Seal	5	FAC	0	Forb	Perennial	Native
medlup	Medicago lupulina	Black Medick	0	FACU	1	Forb	Annual	Adventive
MELLOF	Melilotus officinalis	Yellow Sweet-Clover	0	FACU	1	Forb	Biennial	Adventive
moralb	Morus alba	White Mulberry	0	FAC	0	Tree	Perennial	Adventive
oenbie	Oenothera biennis	King's-Cureall	0	FACU	1	Forb	Biennial	Native
oxastr	Oxalis stricta	Upright Yellow Wood-Sorrel	0	FACU	1	Forb	Perennial	Native
senpla	Packera plattensis	Prairie Groundsel	6	FACU	1	Forb	Perennial	Native
phrausu	Phragmites australis ssp. australis	Common Reed	0	FACW	-1	Grass	Perennial	Adventive
poapra	Poa pratensis	Kentucky Blue Grass	0	FAC	0	Grass	Perennial	Adventive
popdel	Populus deltoides	Eastern Cottonwood	2	FAC	0	Tree	Perennial	Native
salint	Salix interior	Sandbar Willow	1	FACW	-1	Shrub	Perennial	Native
salkal	Salsola tragus	Prickly Russian-Thistle	0	FACU	1	Forb	Annual	Adventive
schsco	Schizachyrium scoparium	Little False Bluestem	5	FACU	1	Grass	Perennial	Native
sedalu	Sedum album	White Stonecrop	0	UPL	2	Forb	Perennial	Adventive
silant	Silene antirrhina	Sleepy Catchfly	1	UPL	2	Forb	Annual	Native
sillat	Silene latifolia	White Campion	0	UPL	2	Forb	Annual	Adventive
soldul	Solanum dulcamara	Climbing Nightshade	0	FAC	0	Vine	Perennial	Adventive
solalt	Solidago altissima	Tall Goldenrod	1	FACU	1	Forb	Perennial	Native
solgig	Solidago gigantea	Late Goldenrod	4	FACW	-1	Forb	Perennial	Native
solsem	Solidago sempervirens	Seaside Goldenrod	0	FACW	-1	Forb	Perennial	Adventive
taroff	Taraxacum officinale	Common Dandelion	0	FACU	1	Forb	Perennial	Adventive
thlarv	Thlaspi arvense	Field Pennycress	0	FACU	1	Forb	Annual	Adventive
tradub	Tragopogon dubius	Sand Goat’s-Beard	0	UPL	2	Forb	Biennial	Adventive
ulmpum	Ulmus pumila	Siberian Elm	0	UPL	2	Tree	Perennial	Adventive
verbra	Verbena bracteata	Carpet Vervain	0	FACU	1	Forb	Annual	Native
vitrip	Vitis riparia	River-Bank Grape	2	FACW	-1	Vine	Perennial	Native
xanstr	Xanthium strumarium	Rough Cockleburr	0	FAC	0	Forb	Annual	Adventive
xanstr	Xanthium strumarium	Rough Cockleburr	0	FAC	0	Forb	Annual	Adventive

SITE: Jeorse Park
LOCALE: Dune & Beach
BY: Robbie Sliwinski
NOTES: Future with project

CONSERVATISM-BASED METRICS		ADDITIONAL METRICS	
MEAN C (NATIVE SPECIES)	5.62	SPECIES RICHNESS (ALL)	64
MEAN C (ALL SPECIES)	4.66	SPECIES RICHNESS (NATIVE)	53
MEAN C (NATIVE TREES)	5.83	% NON-NATIVE	0.17
MEAN C (NATIVE SHRUBS)	8.36	WET INDICATOR (ALL)	1.08
MEAN C (NATIVE HERBACEOUS)	4.52	WET INDICATOR (NATIVE)	1.08
FQAI (NATIVE SPECIES)	40.93	% HYDROPHYTE (MIDWEST)	0.22
FQAI (ALL SPECIES)	37.25	% NATIVE PERENNIAL	0.67
ADJUSTED FQAI	51.17	% NATIVE ANNU	0.11
% C VALUE 0	0.28	% ANNUAL	0.19
% C VALUE 1-3	0.11	% PERENNIAL	0.72
% C VALUE 4-6	0.22		
% C VALUE 7-10	0.39		

SPECIES ACRONYM	SPECIES NAME (NWPL/ MOHLENBROCK)	COMMON NAME	C VALUE	MIDWEST WET INDICATOR	NC-NE WET INDICATOR	WET INDICATOR (NUMERIC)	HABIT	DURATION	NATIVITY
achmil	Achillea millefolium	Common Yarrow	0	FACU	FACU	1	Forb	Perennial	Adventive
amearb	Amelanchier arborea	Downy Service-Berry	8	FACU	FACU	1	Tree	Perennial	Native
ammbre	Ammophila breviligulata	Beach Grass	7	UPL	UPL	2	Grass	Perennial	Native
anecyl	Anemone cylindrica	Thimbleweed	6	UPL	UPL	2	Forb	Perennial	Native
arcuva	Arctostaphylos uva-ursi ssp. coactilis	Bearberry	10	UPL	UPL	2	Shrub	Perennial	Native
artcau	Artemisia caudata	Beach Wormwood	5	UPL	UPL	2	Forb	Biennial	Native
ascsyr	Asclepias syriaca	Common Milkweed	0	FACU	UPL	1	Forb	Perennial	Native
asctub	Asclepias tuberosa ssp. interior	Butterfly-Weed	7	UPL	UPL	2	Forb	Perennial	Native
brotec	Bromus tectorum	Downy Chess	0	UPL	UPL	2	Grass	Annual	Adventive
cakede	Cakile edentula	American Searocket	9	FACU	FACU	1	Forb	Annual	Native
callon	Calamovilfa longifolia	Sand Reed	5	UPL	UPL	2	Grass	Perennial	Native
carpar	Cardamine parviflora var. arenicola	Small-Flowered Bitter Cress	2	FAC	FAC	0	Forb	Annual	Native
cxpens	Carex pensylvanica	Pennsylvania Sedge	5	UPL	UPL	2	Sedge	Perennial	Native
ceaher	Ceanothus herbaceus	Inland New Jersey Tea	10	UPL	UPL	2	Shrub	Perennial	Native
celsca	Celastrus scandens	American Bittersweet	4	FACU	FACU	1	Vine	Perennial	Native
celten	Celtis tenuifolia	Dwarf Hackberry	10	UPL	UPL	2	Shrub	Perennial	Native
cerfon	Cerastium fontanum	Common Mouse-Ear Chickweed	0	FACU	FACU	1	Forb	Perennial	Adventive
cirvul	Cirsium vulgare	Bull Thistle	0	FACU	FACU	1	Forb	Biennial	Adventive
corhys	Corispermum hyssopifolium	American Bugseed	5	FACU	FACU	1	Forb	Annual	Native
corsto	Cornus alba	Red Osier	6	FACW	FACW	-1	Shrub	Perennial	Native

cycatr	Cycloloma atriplicifolium	Winged Pigweed	7	UPL	UPL	2	Forb	Annual	Native
potfru	Dasiphora fruticosa	Golden-Hardhack	10	FACW	FACW	-1	Shrub	Perennial	Native
equhye	Equisetum hyemale	Tall Scouring-Rush	3	FACW	FAC	-1	Fern	Perennial	Native
eupalt	Eupatorium altissimum	Tall Boneset	0	UPL	UPL	2	Forb	Perennial	Native
eupser	Eupatorium serotinum	Late-Flowering Thoroughwort	0	FAC	FAC	0	Forb	Perennial	Native
eupcor	Euphorbia corollata	Flowering Spurge	2	UPL	UPL	2	Forb	Perennial	Native
frapen	Fraxinus pennsylvanica	Green Ash	1	FACW	FACW	-1	Tree	Perennial	Native
helocc	Helianthus occidentalis	Few-Leaf Sunflower	10	FACU	FACU	1	Forb	Perennial	Native
juncom	Juniperus communis	Common Juniper	10	UPL	FACU	2	Shrub	Perennial	Native
junhor	Juniperus horizontalis	Creeping Juniper	10	FACU	FACU	1	Shrub	Perennial	Native
koecri	Koeleria macrantha	June Grass	7	UPL	UPL	2	Grass	Perennial	Native
lacser	Lactuca serriola	Prickly Lettuce	0	FACU	FACU	1	Forb	Biennial	Adventive
latjap	Lathyrus japonicus var. maritimus	Sea Vetchling	10	FACU	FACU	1	Forb	Perennial	Native
lepvir	Lepidium virginicum	Poorman's-Pepperwort	0	FACU	FACU	1	Forb	Annual	Native
liacyl	Liatris cylindracea	Cylindrical Gayfeather	8	UPL	UPL	2	Forb	Perennial	Native
lupper	Lupinus perennis var. occidentalis	Wild Lupine	7	UPL	UPL	2	Forb	Perennial	Native
smiste	Maianthemum stellatum	Starry False Solomon's-Seal	5	FAC	FAC	0	Forb	Perennial	Native
medlup	Medicago lupulina	Black Medick	0	FACU	FACU	1	Forb	Annual	Adventive
oenbie	Oenothera biennis	King's-Cureall	0	FACU	FACU	1	Forb	Biennial	Native
oencle	Oenothera clelandii	Sand Evening-Primrose	7	UPL	UPL	2	Forb	Biennial	Native
opuhum	Opuntia humifusa	Common Prickly-Pear	5	UPL	UPL	2	Shrub	Perennial	Native
oxastr	Oxalis stricta	Upright Yellow Wood-Sorrel	0	FACU	FACU	1	Forb	Perennial	Native
senpla	Packera plattensis	Prairie Groundsel	6	FACU	FACU	1	Forb	Perennial	Native
pinban	Pinus banksiana	Jack Pine	9	FACU	FACU	1	Tree	Perennial	Native
pinstr	Pinus strobus	Eastern White Pine	9	FACU	FACU	1	Tree	Perennial	Native
poapra	Poa pratensis	Kentucky Blue Grass	0	FAC	FACU	0	Grass	Perennial	Adventive
popdel	Populus deltoides	Eastern Cottonwood	2	FAC	FAC	0	Tree	Perennial	Native
prupum	Prunus pumila	Great Lakes Sand Cherry	8	UPL	UPL	2	Shrub	Perennial	Native
ptetrim	Ptelea trifoliata ssp. trifoliata var. mollis	Common Hoptree	7	FACU	FACU	1	Shrub	Perennial	Native
quevel	Quercus velutina	Black Oak	6	UPL	UPL	2	Tree	Perennial	Native
rhuaroe	Rhus aromatica var. arenaria	Fragrant Sumac	9	UPL	UPL	2	Shrub	Perennial	Native
roscar	Rosa carolina	Carolina Rose	5	FACU	FACU	1	Shrub	Perennial	Native
salsyr	Salix cordata	Heart-Leaf Willow	10	FAC	FAC	0	Shrub	Perennial	Native
salgla	Salix myricoides	Bayberry Willow	7	FACW	FACW	-1	Shrub	Perennial	Native
schsco	Schizachyrium scoparium	Little False Bluestem	5	FACU	FACU	1	Grass	Perennial	Native
silant	Silene antirrhina	Sleepy Catchfly	1	UPL	UPL	2	Forb	Annual	Native
sillat	Silene latifolia	White Campion	0	UPL	UPL	2	Forb	Annual	Adventive

solgig	Solidago gigantea	Late Goldenrod	4	FACW	FACW	-1	Forb	Perennial	Native
solspe	Solidago speciosa	Showy Goldenrod	7	UPL	UPL	2	Forb	Perennial	Native
thlarv	Thlaspi arvense	Field Pennycress	0	FACU	UPL	1	Forb	Annual	Adventive
tradub	Tragopogon dubius	Sand Goat’s-Beard	0	UPL	UPL	2	Forb	Biennial	Adventive
verbra	Verbena bracteata	Carpet Vervain	0	FACU	FACU	1	Forb	Annual	Native
vitrip	Vitis riparia	River-Bank Grape	2	FACW	FAC	-1	Vine	Perennial	Native
xanstr	Xanthium strumarium	Rough Cockleburr	0	FAC	FAC	0	Forb	Annual	Adventive

Potential Species Richness as Predicted from Historical and Current Surveys					
	Common Name	***Scientific Name***		**Common Name**	***Scientific Name***
1	Lake Sturgeon	*Acipenser fluvescens*	25	Smallmouth Bass	*Micropterus dolomieu*
2	Alewife*	*Alosa pseudoharengus**	26	Largemouth Bass	*Micropterus salmoides*
3	Rock Bass	*Ambloplites rupestris*	27	White Perch*	*Morone americana**
4	Black Bullhead	*Ameiurus melas*	28	Silver Redhorse	*Moxostoma anisurum*
5	Yellow Bullhead	*Ameiurus natalis*	29	Shorthead Redhorse	*Moxostoma macrolepidotum*
6	Freshwater Drum	*Aplodinotus grunniens*	30	Round Goby*	*Neogobius melanostomus**
7	Goldfish*	*Carassius auratus**	31	Golden Shiner	*Notemigonus crysoleucas*
8	Quillback	*Carpiodes cyprinus*	32	Emerald Shiner	*Notropis atherinoides*
9	Longnose Sucker	*Catostomus catostomus*	33	Spottail Shiner	*Notropis hudsonius*
10	White Sucker	*Catostomus commersonii*	34	Sand Shiner	*Notropis stramineus*
11	Lake Herring	*Coregonus artedi*	35	Coho Salmon*	*Oncorhynchus kisutch**
12	Lake Whitefish	*Coregonus clupeaformis*	36	Rainbow Trout*	*Oncorhynchus mykiss**
13	Common Carp*	*Cyprinus carpio**	37	Rainbow Smelt	*Osmerus mordax*
14	Gizzard Shad	*Dorosoma cepedianum*	38	Yellow Perch	*Perca flavescens*
15	Northern Pike	*Esox lucius*	39	Logperch	*Percina caprodes*
16	Banded Killifish	*Fundulus diaphanus*	40	Trout-perch	*Percopsis omiscomaycus*
17	Threespine Stickleba	*Gasterosteus aculeatus**	41	Bluntnose Minnow	*Pimephales notatus*
18	Chestnut Lamprey	*Ichthyomyzon castaneus*	42	Fathead Minnow	*Pimephales promelas*
19	Channel Catfish	*Ictalurus punctatus*	43	White Crappie	*Pomoxis annularis*
20	Longnose Gar	*Lepisosteus osseus*	44	Black Crappie	*Pomoxis nigromaculatus*
21	Green Sunfish	*Lepomis cyanellus*	45	Ninespine Stickleback	*Pungitius pungitius*
22	Pumpkinseed	*Lepomis gibbosus*	46	Longnose Dace	*Rhinichthys cataractae*
23	Bluegill	*Lepomis macrochirus*	47	Brown Trout*	*Salmo trutta**
24	Burbot	*Lota lota*	48	Lake Trout	*Salvelinus namaycush*
			49	Walleye	*Sander vitreus*

*non-native species

Forecasted Species Richness & Calculated HSI at Project Year 50		
Habitat Restoration Measure	**Predicted Species Richness (R)**	**HSI (R/4.9)**
RR	47	9.591836735
BP	35	7.142857143
BWM	20	4.081632653

Forecasted Maximum Habitat Units at Project Year 50			
Habitat	**Affected Acreage**	**HSI**	**HU**
RR	25	9.6	240
BP	1	7.1	7.1
BWM	25	4.1	102.5

Predicted Species Use of Varying Habitat Restoration Measures					
Common Name	***Scientific Name***		**Respond to Rock Reef**	**Respond to Breakwater Plants**	**Respond to Hydraulic Restoration (BWM or PB)**
Lake Sturgeon	*Acipenser fluvescens*		x		
Alewife*	*Alosa pseudoharengus**				x
Rock Bass	*Ambloplites rupestris*		x	x	x
Black Bullhead	*Ameiurus melas*		x	x	x
Yellow Bullhead	*Ameiurus natalis*		x	x	x
Freshwater Drum	*Aplodinotus grunniens*		x		x
Goldfish*	*Carassius auratus**			x	
Quillback	*Carpiodes cyprinus*		x	x	x
Longnose Sucker	*Catostomus catostomus*		x	x	x
White Sucker	*Catostomus commersonii*		x	x	x
Lake Herring	*Coregonus artedi*		x		
Lake Whitefish	*Coregonus clupeaformis*		x	x	
Common Carp*	*Cyprinus carpio**		x	x	
Gizzard Shad	*Dorosoma cepedianum*		x		x
Northern Pike	*Esox lucius*		x		x
Banded Killifish	*Fundulus diaphanus*		x	x	x
Threespine Stickleba	*Gasterosteus aculeatus**		x	x	
Chestnut Lamprey	*Ichthyomyzon castaneus*		x		
Channel Catfish	*Ictalurus punctatus*		x	x	
Longnose Gar	*Lepisosteus osseus*		x		
Green Sunfish	*Lepomis cyanellus*		x	x	
Pumpkinseed	*Lepomis gibbosus*		x	x	x
Bluegill	*Lepomis macrochirus*		x	x	x
Burbot	*Lota lota*		x		
Smallmouth Bass	*Micropterus dolomieu*		x	x	x
Largemouth Bass	*Micropterus salmoides*		x	x	
White Perch*	*Morone americana**		x	x	
Silver Redhorse	*Moxostoma anisurum*		x	x	
Shorthead Redhorse	*Moxostoma macrolepidotum*		x	x	
Round Goby*	*Neogobius melanostomus**		x		
Golden Shiner	*Notemigonus crysoleucas*		x	x	
Emerald Shiner	*Notropis atherinoides*		x	x	
Spottail Shiner	*Notropis hudsonius*		x	x	x
Sand Shiner	*Notropis stramineus*		x	x	x
Coho Salmon*	*Oncorhynchus kisutch**		x		x
Rainbow Trout*	*Oncorhynchus mykiss**		x		x
Rainbow Smelt	*Osmerus mordax*		x	x	
Yellow Perch	*Perca flavescens*		x	x	
Logperch	*Percina caprodes*		x	x	
Trout-perch	*Percopsis omiscomaycus*		x	x	x
Bluntnose Minnow	*Pimephales notatus*		x	x	
Fathead Minnow	*Pimephales promelas*		x	x	
White Crappie	*Pomoxis annularis*		x	x	
Black Crappie	*Pomoxis nigromaculatus*		x	x	
Ninespine Stickleback	*Pungitius pungitius*		x	x	
Longnose Dace	*Rhinichthys cataractae*		x	x	x
Brown Trout*	*Salmo trutta**		x	x	
Lake Trout	*Salvelinus namaycush*		x		
Walleye	*Sander vitreus*		x		
	Total Species Affected		**47**	**35**	**20**

Future without Project Average Annual Habitat Suitability Indix Scores and Habitat Units						
Description	**Habitat Types**	**Acres**	**ExHSI**	**AAHSI**	**HUs**	**AAHUs**
Current Conditions	Lacustrine	25	3.1		77.5	
	Beach & Dune	15.8	1.35		20.25	
No Action / FWOP	Lacustrine	25	3.1	3.1		77.5
	Beach & Dune	15.8	1.35	1.35		20.25

HSI Calculations
Beach & Dune (D, IPR) = Mean C
Lacustrine (RR, BWM) = R/4.9
Beach, Dune & Lacustrine (BP) = Mean C + (R/4.9)

HSI for Existing & Future without Project Conditions		
Beach & Dune (D, IPR)	Lacustrine (RR, BWM)	Beach, Dune & Lacustrine (BP)
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
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1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
1.35	3.1	4.45
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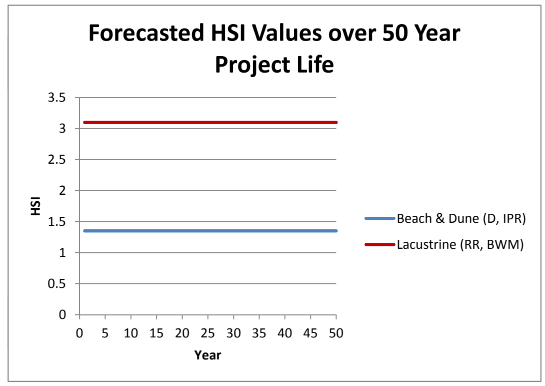
1.35	3.1	4.45
1.35	3.1	4.45

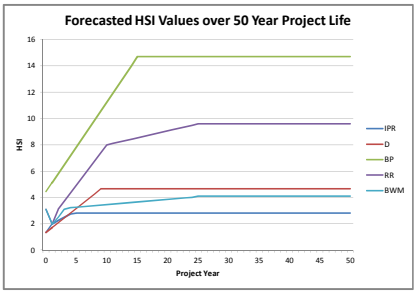


Summary Table of Habitat Unit Calculation at Project Completion (50 years)				
Measure	**R / Mean C**	**HSI**	**Acres**	**HUs**
RR	47 / na	9.6	25	240
BWM	20 / na	4.1	25	102.5
D	na / 4.66	4.66	14.8	68.968
BP*	35 / 7.56	14.7	3	44.1
IPR	na / 2.81	2.81	15.8	44.398

*BP HSI = Mean C + (R/4.9)

Future without and Future with Project Benefits as measured in Habitat Units					
Description	**Habitat Type / Restoration Measure**	**Acres Affected**	**AAHSI**	**AAHUs**	**NAAHUs**
No Action / FWOP	Dune & Beach / IPR	15.8	1.35	20.25	
	Dune & Beach / D	14.8	1.35	19.98	
	Dune & Beach & Lacustrine / BP	3	4.45	13.35	
	Lacustrine / RR	25	3.1	77.5	
	Lacustrine / BWM	25	3.1	77.5	
Action / FWP	Dune & Beach / IPR	15.8	2.75	43.45	23.2
	Dune & Beach / D	14.8	4.33	64.084	44.104
	Dune & Beach & Lacustrine / BP	3	13.1	39.3	25.95
	Lacustrine / RR	25	8.39	209.75	132.25
	Lacustrine / BWM	25	3.79	94.75	17.25

Net Average Annual Habitat Units are calculated using the difference in FWP AAHUs and FWOP AAHUs of equal acres.



Forecasted HIS Values over 50 Year Project Life

Project Year	Dune & Beach / IPR	Dune & Beach / D	Dune & Beach & Lacustrine / BP	Lacustrine / RR	Lacustrine / BWM
0	1.35	1.35	4.45	3.1	3.1
1	2	1.717	5.13	2	2
2	2.25	2.084	5.81	3.1	2.5
3	2.5	2.451	6.49	3.7125	3.1
4	2.75	2.818	7.17	4.325	3.22
5	2.81	3.185	7.85	4.9375	3.26
6	2.81	3.552	8.53	5.55	3.3
7	2.81	3.919	9.21	6.1625	3.34
8	2.81	4.286	9.89	6.775	3.38
9	2.81	4.653	10.57	7.3875	3.42
10	2.81	4.66	11.25	8	3.46
11	2.81	4.66	11.93	8.106	3.5
12	2.81	4.66	12.61	8.212	3.54
13	2.81	4.66	13.29	8.318	3.58
14	2.81	4.66	13.97	8.424	3.62
15	2.81	4.66	14.7	8.53	3.66
16	2.81	4.66	14.7	8.636	3.7
17	2.81	4.66	14.7	8.742	3.74
18	2.81	4.66	14.7	8.848	3.78
19	2.81	4.66	14.7	8.954	3.82
20	2.81	4.66	14.7	9.06	3.86
21	2.81	4.66	14.7	9.166	3.9
22	2.81	4.66	14.7	9.272	3.94
23	2.81	4.66	14.7	9.378	3.98
24	2.81	4.66	14.7	9.484	4.02
25	2.81	4.66	14.7	9.6	4.1
26	2.81	4.66	14.7	9.6	4.1
27	2.81	4.66	14.7	9.6	4.1
28	2.81	4.66	14.7	9.6	4.1
29	2.81	4.66	14.7	9.6	4.1
30	2.81	4.66	14.7	9.6	4.1
31	2.81	4.66	14.7	9.6	4.1
32	2.81	4.66	14.7	9.6	4.1
33	2.81	4.66	14.7	9.6	4.1
34	2.81	4.66	14.7	9.6	4.1
35	2.81	4.66	14.7	9.6	4.1
36	2.81	4.66	14.7	9.6	4.1
37	2.81	4.66	14.7	9.6	4.1
38	2.81	4.66	14.7	9.6	4.1
39	2.81	4.66	14.7	9.6	4.1
40	2.81	4.66	14.7	9.6	4.1
41	2.81	4.66	14.7	9.6	4.1
42	2.81	4.66	14.7	9.6	4.1
43	2.81	4.66	14.7	9.6	4.1
44	2.81	4.66	14.7	9.6	4.1
45	2.81	4.66	14.7	9.6	4.1
46	2.81	4.66	14.7	9.6	4.1
47	2.81	4.66	14.7	9.6	4.1
48	2.81	4.66	14.7	9.6	4.1
49	2.81	4.66	14.7	9.6	4.1
50	2.81	4.66	14.7	9.6	4.1
Average Annual	**2.75**	**4.33**	**13.1**	**8.39**	**3.79**

Correspondence

This section provides copies of correspondence letters and emails with stakeholders, the local sponsor and partner state and federal agencies. These letters include the original NEPA scoping letter that was sent out to stakeholders and the response letters that were received from that scoping action.

NEPA Scoping Letter – Distribution List

A NEPA scoping letter was distributed on 28 October 2013 to the following list of agencies and individual stakeholders who may have had input into the scope of the proposed restoration project.

Kenneth Westlake, Chief
Environmental Review Branch
U.S. EPA ME-19J
77 West Jackson
Chicago, IL 60604

U.S. Fish and Wildlife Service
620 S. Walker St.
Bloomington, IN 47403
ATTN: Scott Pruitt

U.S. Fish and Wildlife Service
P.O. Box 2616
Chesterton, IN 46304-2616
ATTN: Elizabeth McCloskey

IDEM Northwest Regional Office
8380 Louisiana Street
Merrillville, IN 46410
ATTN: Hala Kuss

IDEM
100 N. Senate Ave.
Mail Code 61-50
Indianapolis, IN 46204-2251
ATTN: Marty Maupin

Indiana DNR
Division of Water
100 N. Water St.
Michigan City, IN 46360
ATTN: Steve Davis

Indiana DNR
Division of Fish and Wildlife
402 W. Washington Room W273
Indianapolis, IN 46204

ATTN: Christie Stanifer

Indiana DNR
Division of Historic Preservation and History
402 W. Washington, Room W274
Indianapolis, IN 46204
ATTN: James Glass

Indiana DNR
Lake Michigan Coastal Program
402 W. Washington, Room W274
Indianapolis, IN 46204
ATTN: Mike Molnar

Little Calumet River Basin Development Commission c/o NIRPC
900 Ridge Rd Suite H
Munster, IN 46321

Kickapoo Tribe of Oklahoma
P.O. Box 70
McCloud, OK 74851

Kickapoo Of Kansas
1107 Goldfinch Rd.
Horton, KS 66434

Kickapoo Tribe of Texas
Box HC 1 9700
Eagle Pass, TX 78853

Miami Nation in Indiana
P.O. Box 41
Peru, IN 46970

Miami Tribe of Oklahoma
P.O. Box 1326
Miami, OK 74355
Attn: Mr. George Strack

Citizen Potawatomi Nation
1901 S. Gordon Cooper Dr.
Shawnee, OK 74801

Forest County Potawatomi Exec. Council
P. O. Box 340
Crandon, WI 54520

Nottawaseppi Huron Potawatomi Tribal Office
2221 One-and-a-half Mile Rd.
Fulton, MI 49052

Hannahville Potawatomi Comm., Council
N 14911 Hannahville Road
Wilson, MI 49896-9728

Prairie Band Potawatomi Tribal Council
16281 Q RD
Mayetta, KS 66509

Pokagon Band of Potawatomi Indians
P.O. Box 180
Dowagiac, MI 49047

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

REPLY TO
ATTENTION OF

Planning Branch
Environmental Formulation Section

Kenneth Westlake, Chief
Environmental Review Branch
U.S. EPA ME-19J
77 West Jackson
Chicago, IL 60604

28 OCT 2013

Dear Mr. Westlake:

The Chicago District is preparing a National Environmental Policy Act (NEPA) document on impacts of an ecosystem restoration project in the City of East Chicago, Lake County, Indiana. As part of the scoping process the Chicago District would appreciate your comments. A map of the project area is included with this letter.

This project includes beach and dune stabilization and construction of a near shore reef for enhanced fish spawning and foraging habitat. The project will also focus on the removal of non-native invasive plants, and the planting of native plant species.

Please comment within 30 days, marking your reply to the attention of Mr. Peter Bullock, U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604. Questions may be directed to Mr. Bullock at 312/846-5587, or at peter.y.bullock@usace.army.mil. Your assistance is appreciated.

Sincerely,

/S/

Susanne J. Davis, P. E.
Chief of Planning Branch

Enclosure

Bullock PM-PL-E 10/28/2013
Fleming PM-PL-E 10/28/13
Buczak PM-PM KAB 10/28/13
Davis PM-PL SJD 10/28/13

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

REPLY TO
ATTENTION OF

Planning Branch
Environmental Formulation Section

Ben Bobb A. Beauchamp
Federal Aviation Administration
Chicago Airports District Office, CHI-ADO-600
2300 East Devon Avenue
Des Plaines, Illinois 60018

Dear Mr. Beauchamp:

The Chicago District is preparing a National Environmental Policy Act (NEPA) document on impacts of an ecosystem restoration project in the City of East Chicago, Lake County, Indiana. As part of the scoping process the Chicago District would appreciate your comments. A map of the project area and the results of a seven mile search radius for airports surrounding the project location from the FAA website are included with this letter.

This project includes beach and dune stabilization and construction of a near shore reef for enhanced fish spawning and foraging habitat. The project will also focus on the removal of non-native invasive plants, and the planting of native plant species. The planting plan will be focused on increasing migratory song bird habitat while decreasing attractants to nuisance waterfowl such as geese and gulls.

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Sincerely,

Susanne J. Davis, P. E.
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

REPLY TO
ATTENTION OF

Planning Branch
Environmental Formulation Section

Judy Loven
USDA-APHIS
Indiana Wildlife Service's State Director
901 W. State Street
W. Lafayette, IN 47907-2089

Dear Ms. Loven:

The Chicago District is preparing a National Environmental Policy Act (NEPA) document on impacts of an ecosystem restoration project in the City of East Chicago, Lake County, Indiana. As part of the scoping process the Chicago District would appreciate your comments. A map of the project area and the results of a seven mile search radius for airports surrounding the project location from the FAA website are included with this letter.

This project includes beach and dune stabilization and construction of a near shore reef for enhanced fish spawning and foraging habitat. The project will also focus on the removal of non-native invasive plants, and the planting of native plant species. The planting plan will be focused on increasing migratory song bird habitat while decreasing attractants to nuisance waterfowl such as geese and gulls.

Please comment within 30 days, marking your reply to the attention of Mr. Peter Bullock, U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604. Questions may be directed to Mr. Bullock at 312/846-5587, or at peter.y.bullock@usace.army.mil. Your assistance is appreciated.

Sincerely,

Susanne J. Davis, P. E.
Chief of Planning Branch

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
231 SOUTH LA SALLE STREET, SUITE 1500
CHICAGO IL 60604

REPLY TO
ATTENTION OF

Planning Branch
Environmental Formulation Section

Kevin Rector
Manager, aviation
IN Department of Transportation
100 N. Senate Ave.
Indianapolis, IN 46204

Dear Mr. Rector:

The Chicago District is preparing a National Environmental Policy Act (NEPA) document on impacts of an ecosystem restoration project in the City of East Chicago, Lake County, Indiana. As part of the scoping process the Chicago District would appreciate your comments. A map of the project area and the results of a seven mile search radius for airports surrounding the project location from the FAA website are included with this letter.

This project includes beach and dune stabilization and construction of a near shore reef for enhanced fish spawning and foraging habitat. The project will also focus on the removal of non-native invasive plants, and the planting of native plant species. The planting plan will be focused on increasing migratory song bird habitat while decreasing attractants to nuisance waterfowl such as geese and gulls.

Please comment within 30 days, marking your reply to the attention of Mr. Peter Bullock, U.S. Army Corps of Engineers, 231 South La Salle Street, Suite 1500, Chicago, Illinois 60604. Questions may be directed to Mr. Bullock at 312/846-5587, or at peter.y.bullock@usace.army.mil. Your assistance is appreciated.

Sincerely,

/S/

Susanne J. Davis, P. E.
Chief of Planning Branch

United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

November 18, 2013

Mrs. Susanne J. Davis
Chief of Planning Branch
Chicago District
U.S. Army Corps of Engineers
231 South LaSalle Street, Suite 1500
Chicago, Illinois 60604

Attn: Mr. Peter Bullock, Environmental Formulation Section

Dear Mrs. Davis:

This responds to your letter dated October 28, 2013, requesting our comments on a proposed ecosystem restoration project in East Chicago, Lake County, Indiana. The proposed project consists of beach and dune stabilization and construction of a near shore reef to enhance fish spawning and foraging habitat at and offshore of Jeorse Park along the shoreline of Lake Michigan. Also included are the removal of non-native invasive plants and the planting of native species.

These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.) and are consistent with the intent of the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, and the U. S. Fish and Wildlife Service's Mitigation Policy.

The proposed project area includes the beach at Jeorse Park, the breakwater to its north which protects the East Chicago Marina and Ameristar Casino boat, and an inland dune area between several sets of railroad tracks. However, the inland dune area is not available for restoration as part of this Federal project. It is privately owned by the Canadian National Railway as Yard A/B and is being restored to wetlands and dunes by that corporation as part of the required mitigation for the expansion of the Kirk Rail Yard under Chicago District permit LRC-2010-803-IN. Please contact Mr. Paul Leffler of the Regulatory Branch for information about this permit and the mitigation that is occurring at this site.

Jeorse Park is located along the southern shore of Lake Michigan at the southeast base of the large ArcelorMittal Indiana Harbor lakefill. The Buffington Harbor breakwaters are to the southeast, leaving Jeorse Park within as isolated node of the shoreline. Therefore, it is outside of the normal littoral sand transport zones along the lake shore; little sand is washed away but little sand is deposited at the site, resulting in a relatively stable but small beach. Except for the adjacent breakwaters, fishery habitat is generally lacking.

The U.S. Fish and Wildlife Service supports activities at Jeorse Park that would enhance the beach and back beach habitats and that would enhance aquatic habitat within this heavily developed area. We look forward to reviewing project plans as this ecosystem restoration proposal progresses.

ENDANGERED SPECIES

The proposed project is within the range of the Federally endangered Indiana bat (Myotis sodalis) and Karner blue butterfly (Lycaeides melissa samuelis), the proposed endangered northern long-eared bat (Myotis septentrionalis), and the threatened Pitcher's thistle (Cirsium pitcheri) and Mead's milkweed (Asclepias meadii). There is no habitat for any of these species at the proposed project site. Although the Pitcher's thistle is found in back beach and dune blowout habitats around Lake Michigan, this site is too isolated and small to be a viable location to reintroduce this threatened species. Therefore, we agree that this proposed project is not likely to adversely affect, or to enhance, these endangered, proposed endangered, and threatened species.

This precludes the need for further consultation on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. However, should new information arise pertaining to project plans or a revised species list be published, it will be necessary for the Federal agency to reinitiate consultation.

We appreciate the opportunity to comment at this early stage of project planning. For further discussion, please contact Elizabeth McCloskey at (219) 983-9753 or elizabeth_mccloskey@fws.gov.

Sincerely yours,

Elizabeth S. McCloskey
Acting
for Scott E. Pruitt
Supervisor

cc: Christie Stanifer, Environmental Coordinator, Division of Water, Indianapolis, IN
Steve Davis, IDNR , Division of Water, Michigan City, IN
Marty Maupin, IDEM, Office of Water Management, Indianapolis, IN
USEPA, NEPA Implementation Section, Chicago, IL

United States Department of Agriculture

Animal and Plant Health Inspection Service

Wildlife Services
SMTH Hall-Purdue University
901 W. State Street
W. Lafayette, IN 47907-2089
765-494-6229 (O)
765-494-9475 (F)

December 30, 2014

Mr. Peter Bullock
U.S. Army Corps of Engineers
231 South LaSalle Street
Suite 1500
Chicago, IL 60604

Dear Mr. Bullock,

I have reviewed the site for the proposed ecosystem restoration project at Jeorse Park Beach, East Chicago, IN. The site does fall with the FAA area of concern for any wildlife habitat enhancement near an airport, in this case, the Gary-Chicago International Airport. The description of the enhancement actions planned appear to have a low potential to create a significant threat to aircraft movements associated with the Gary-Chicago International Airport. However, due to the dynamic nature of wildlife populations, I recommend that an ongoing relationship with the Gary-Chicago International Airport be established to address any issues that may develop in the future.

Sincerely,

Judy S. Loven
State Director, Indiana
judy.s.loven@aphis.usda.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

E-19J

Peter Bullock
U.S. Army Corps of Engineers - Chicago District
231 N. LaSalle St., Ste. 1500
Chicago, Illinois 60604

RE: Scoping comments – East Chicago lakefront/Jeorse Park Ecosystem Restoration Project; City of East Chicago, Lake County, Indiana

Dear Mr. Bullock:

The U.S. Environmental Protection Agency has received U.S. Army Corps of Engineers (USACE) correspondence (hereafter: scoping document) dated October 28, 2013, requesting EPA's review of and comments on a proposed ecosystem restoration project at and adjacent to Jeorse Park, including along Lake Michigan, in East Chicago, Indiana. EPA has reviewed your correspondence and figure provided for the aforementioned project. This letter provides our comments on the scoping document pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementing Regulations (40 CFR 1500-1508), and Section 309 of the Clean Air Act.

As stated in your cover letter, the ecosystem restoration project proposes "beach and dune stabilization and construction of a near shore reef for enhanced fish spawning and foraging habitat. The project will also focus on the removal of non-native invasive plants, and the planting of native plant species." Your scoping document did not provide any additional information such as the baseline health or status of the current environments and habitats, coverage and types of invasive species proposed to be removed, restoration activities proposed to be undertaken, or how USACE proposes to restore native plant communities within the project area. These elements, along with information on how USACE will ensure that non-native invasive species do not return to restoration areas, and how restoration areas will be protected from trampling and other disturbances, should all be analyzed and discussed in the upcoming environmental assessment (EA).

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Due to the lack of information provided in your scoping document, EPA is unable to provide substantive comments or recommendations on your proposal. We can, however, offer the following broad comments that should be addressed in the forthcoming Draft EA.

- Coordination with the U.S. Fish and Wildlife Service (USFWS) and the Indiana Department of Natural Resources (IDNR) should also be undertaken to ensure that any proposals will not detrimentally effect any federally-endangered or threatened species or critical habitat or any state-endangered or threatened species or critical habitat that are likely to be present at the project site. The Fish and Wildlife Coordination Act[1] requires that agencies consult with the state wildlife agencies and USFWS concerning the conservation of wildlife resources where the water of any stream or other water body is proposed to be controlled or modified by a Federal agency or any public or private agency operating under a Federal permit. As this project potentially involves modifications to waterbodies, consultation with these agencies appears to be warranted.

- The Draft EA should include the status of National Historic Preservation Act Section 106 consultation with the State Historic Preservation Office (SHPO). In addition to the narrative status of this consultation, EPA requests that you include copies of correspondence sent to, and received from, the SHPO. The Draft EA should also include figures defining the Area of Potential Effect (APE) for this project.

- The Draft EA should also discuss potential construction timeframes and seasons, and how visitors might be impacted based on typical uses of the area. Due to the likelihood of public involvement and site visitation during project implementation, installation of signage during project implementation (covering the different phases of construction, maintenance activities, and anticipated final results, among others) is strongly encouraged.

- The Draft EA should identify where the project documents will be available for review (e.g., libraries, community centers, etc.). Because the project has potential to impact residents and visitors, EPA recommends that USACE reach out to both types of users (i.e., post a notice of construction on Northwest Indiana tourism websites and the East Chicago Park District website, in addition to other forms of notification).

- The Draft EA should include a Monitoring and Adaptive Management Plan. The plan should include a description of proposed monitoring activities at the project location, include quantifiable and measureable success criteria for the ecosystem restoration work, and should specify the length of the monitoring period(s). Additional information on the party(ies) who will maintain the site in perpetuity, as well as USACE's point of contact at the East Chicago Park District, should also be included in the Draft EA.

- The Draft EA should list all required permits (and their issuing agencies) that will be required for project implementation.

[1] 16 U.S.C. §§661-666c; PL 85-624

- The Draft EA should recommend specific measures and best management practices (BMPs) that will be undertaken to minimize construction impacts to air quality, water resources, soil, and other regulated resources.

- The Draft EA should include narrative information on site access, construction equipment staging, and how the project will be constructed. Measures to be taken to further minimize impacts to onsite wetlands, Lake Michigan, and their associated sensitive aquatic habitats should be discussed in the Draft EA.

- The Draft EA should identify and discuss existing air quality and air quality impacts at the project location, and those potentially associated with future construction and operations at site of the proposed project. The proposed action's impacts on air quality should be assessed by evaluating the impact of the proposed actions on the National Ambient Air Quality Standards (NAAQS).

- The Draft EA should discuss existing water quality impairments (under the Clean Water Act 303(d) list of impaired water bodies) within the project boundaries, and how the proposed project will affect those impairments.

- The Draft EA should demonstrate that USACE has determined whether hazardous wastes as defined in 40 CFR part 261 (RCRA) will be generated, disturbed, transported or treated, stored or disposed, by the action(s) under consideration. If so, management of these wastes is regulated by 40 CFR parts 260-280 and transportation is governed by 49 CFR parts 171-199. An appropriate level of review regarding the hazardous nature of any materials or wastes to be used, generated, or disturbed by the proposed action, as well as the control measures to be taken, should be provided in the EA.

- The forthcoming EA should document how proposed future actions to be undertaken are in compliance with existing guidance and procedures, including, but not limited to: Environmental Justice: Guidance Under the National Environmental Policy Act, December 10, 1997; Final Guidance for Consideration of Environmental Justice in Clean Air Act 309 Reviews, July 1999; and Executive Order 12898.

- For all environmental impact categories requiring coordination with other Federal or state agencies, EPA recommends that you provide copies of both your letters to those agencies, as well as the responses from those agencies, as appendices to the EA.

EPA has repeatedly asked you for detailed information on proposed projects on scoping documents. An overview figure with one to three sentences on a proposed project does not provide EPA with appropriate levels of information on which to provide informed and substantive comments. In order to improve the scoping process for both of our agencies, EPA reiterates, again, comments we continually make that the more information you provide to us during the scoping process, the more beneficial the NEPA process will be.

Thank you for the early solicitation of EPA's comments regarding the proposal. We are available to discuss our comments with you in further detail if requested. Please send one paper copy and one CD-ROM copy of the Draft EA to my attention once it becomes available. If you have any questions about this letter, please contact Ms. Liz Pelloso, PWS, of my staff at 312-886-7425 or via email at pelloso.elizabeth@epa.gov.

Sincerely,

EAPoole

for Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Enforcement and Compliance Assurance

cc: James Glass, Indiana Historic Preservation Agency (SHPO)
Matt Buffington, IDNR-DFW
Steve Davis, IDNR-Lake Michigan Specialist
Marty Maupin, IDEM-401 WQC
Liz McCloskey, USFWS
Superintendent, East Chicago Parks Department

Michael R. Pence, Governor
Cameron F. Clark, Director

DNR Indiana Department of Natural Resources

Division of Historic Preservation & Archaeology•402 W. Washington Street, W274 · Indianapolis, IN 46204-2739
Phone 317-232-1646•Fax 317-232-0693 · dhpa@dnr.IN.gov

HISTORIC PRESERVATION AND ARCHAEOLOGY

December 2, 2013

Susanne Davis
U.S. Army Corps of Engineers
Chicago District
231 South LaSalle Street, Suite 1500
Chicago, Illinois 60604

Federal Agency: U.S. Army Corps of Engineers, Chicago District

Re: Request for comment regarding beach and dune stabilization & construction of a near shore reef for enhanced fish spawning & foraging habitat (DHPA #15469)

Dear Ms. Davis:

Pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. § 470f) and 36 C.F.R. Part 800, the staff of the Indiana State Historic Preservation Officer ("Indiana SHPO") has conducted an analysis of the materials dated October 28, 2013 and received on October 30, 2013, for the above indicated project in East Chicago, Lake County, Indiana.

Based upon the documentation available to the staff of the Indiana SHPO, we have not identified any historic buildings, structures, districts, or objects listed in or eligible for inclusion in the National Register of Historic Places within the probable area of potential effects.

In terms of potential impact on archaeological resources, two adjacent shipwrecks recorded as one archaeological site (12La640) have been recorded within the proposed project area. Additional underwater or terrestrial sites may exist in the proposed project area. Please provide a detailed description and illustration of the proposed project activities, including any proposed ground disturbance, dredging, filling, reef construction, and/or placement of riprap, gabions, or other stabilization methods. Please also describe how the proposed project may alter the current or wave action in regard to the existing shoreline.

Once the indicated information is received, the Indiana SHPO will resume identification and evaluation procedures for this project. Please keep in mind that additional information may be requested in the future.

A copy of the revised 36 C.F.R. Part 800 that went into effect on August 5, 2004, may be found on the Internet at www.achp.gov for your reference. If you have questions about archaeological issues please contact Cathy Draeger-Williams at (317) 234-3791 or cdraeger-williams@dnr.IN.gov. If you have questions about buildings or structures please contact Kim Marie Padgett at (317) 234-6705 or kpadgett@dnr.IN.gov. Additionally, in all future correspondence regarding the above indicated project, please refer to DHPA #15469.

Very truly yours,

Mitchell K. Zoll
Deputy State Historic Preservation Officer

MKZ:KMP:CDW:cdw

emc: Peter Bullock, U.S. Army Corps of Engineers, Chicago District
Diedra Willis, U.S. Army Corps of Engineers, Chicago District

Shanks, Matthew R LRC

From: Bullock, Peter Y LRC
Sent: Tuesday, November 12, 2013 10:32 AM
To: Shanks, Matthew R LRC
Cc: Fleming, Eugene J LRC
Subject: RE: Jeorse Park Beach East Chicago Indiana (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

It's really up to you and Gene. You might start with an email to Ms. Kuss.
Pete

-----Original Message-----
From: Shanks, Matthew R LRC
Sent: Tuesday, November 12, 2013 10:18 AM
To: Bullock, Peter Y LRC
Subject: Re: Jeorse Park Beach East Chicago Indiana (UNCLASSIFIED)

I can make tomorrow work for a call. If not, just let me know when a reschedule can be arranged. I'll stay flexible.
Matthew Shanks
US Army Corps, Chicago District
111 N Canal St. Suite 600
Chicago, I'll 60606
Ph: 312-846-5581
Cell: 312-806-3760

----- Original Message -----
From: Bullock, Peter Y LRC
Sent: Tuesday, November 12, 2013 07:43 AM Pacific Standard Time
To: Shanks, Matthew R LRC
Subject: FW: Jeorse Park Beach East Chicago Indiana (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Matt,
Gene said to pass this on to you.
Pete

-----Original Message-----
From: Snyder, Ashley [mailto:ASnyder@idem.IN.gov]
Sent: Tuesday, November 05, 2013 4:37 PM
To: Bullock, Peter Y LRC
Cc: Kuss, Hala; Caldwell, Michelle
Subject: [EXTERNAL] Jeorse Park Beach East Chicago Indiana

Mr. Bullock,

We received your letter regarding the Army Corps. intended work at Jeorse Park beach in East Chicago, Indiana. We had spoke with Matthew Shanks in September regarding work at Jeorse Park and we want to verify that your letter is in regards to that same project. We then would like

to have a phone conference with you to go over the work and make sure goals for Jeorse Park are consistent across projects and programs as this is an Area of Concern beach. We have the following dates open at 2 PM for a phone conference: Nov. 7th and Nov. 13th. If one of those dates works please let us know and if not we can work on setting up another time.

Thank You,

Ashley Snyder

LaMP/RAP Program Coordinator

Indiana Department of Environmental Management

Northwest Regional Office

330 West US Highway 30, Suites E & F

Valparaiso, IN 46385

ph: 219/ 464 - 0437

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

Compliance

This section includes the evaluation of impacts to the Lake Michigan ecosystem and affected habitat due to fill material placement within the lake as well as Section 7 consultation with the US Fish and Wildlife Service (USFWS) threatened and endangered species database. Evaluation of fill material within Lake Michigan was completed to satisfy the requirements under Section 404(b)1 of the Clean Water Act. The 404(b)1 analysis includes a project description, description of fill material, and effects to both the biotic and abiotic resources at the project location and surrounding area. The analysis also provides a summary of findings of compliance with the restrictions on discharge set forth in the Clean Water Act. Following the 404(b)1 analysis, results from the USFWS database search are attached. These results provide the distribution of federally-listed threatened, endangered, proposed, and candidate species within each county of Indiana. Lake County includes five listed species which the Detailed Project Report reviewed for potential impacts due to the proposed project. Furthermore, a draft Finding of No Significant Impact (FONSI) statement is included. The preliminary FONSI concludes that implementing the tentatively recommended alternative does not constitute a major Federal action that significantly affects the quality of the human environment.

SECTION 404(B)(1) EVALUATION

I. Project Description

a. Location

Jeorse Park Beach, owned and operated by the City of East Chicago, is located along the Lake Michigan shoreline just southeast of the Indiana Harbor and Shipping Canal in Lake County, IN. The park is bounded to the north by the Ameristar Casino, to the west by Cline Avenue and the Majestic Star Hotel parking lot, to the south by the Majestic Star Casino, and to the east by Lake Michigan. The project site is adjacent to Amtrack railroad lines with approximately 15.8 acres of beach and dune habitat on the lakeside.

b. General Description

Ecological conditions at Jeorse Park Beach and the surrounding area have been severely impacted by human development and land change use. The Jeorse Park Beach Sec 506 Great Lakes Fishery and Ecosystem Restoration Study has identified a National Ecosystem Restoration (NER) plan that addresses the decline in available habitat for fish and wildlife. The NER plan will protect limited existing resources, increase available habitat above and below the water line, and improve overall ecosystem structure and function. The NER plan was developed in coordination with other Federal, State and Local stakeholders and includes beach and dune plantings of woody and herbaceous native species, invasive plant species removal, creation of rock reef habitat and vegetating viable portions of a breakwater structure. The NER plan is consistent with applicable Local, State and Federal objectives, authorities and policies.

c. Authority and Purpose

The Jeorse Park Beach feasibility study is authorized under Section 506 of the Water Resources Development Act (WRDA) of 2000, Great Lakes Fishery and Ecosystem Restoration. Authority is given to plan, design, and construct projects to restore the fishery, ecosystem, and beneficial uses of the Great Lakes. Projects are justified by ecosystem benefits alone, while considering affects to the human environment including public health, safety, economic benefits, recreational or any combination of these.

The purpose of the recommended NER plan is to maximize ecological benefits that can be achieved at the Jeorse Park Beach and it's near shore waters. A plan was developed to achieve the greatest benefits by addressing habitat scarcity, connectivity and biodiversity issues both locally and across the regional landscape. Increasing and improving near shore fish habitat is addressed within the project objectives and resulted in the recommendation of cobble mound reef placement within near shore Lake Michigan. The following describes further detail of the objective as it is stated in the Jeorse Park Beach feasibility report:

<u>Objective 3 – Increase the Quality and Quantity of Available Fish Habitat</u>

Structural fisheries habitat within the vicinity of Jeorse Park Beach is available in the form of man-made structures including large armor stone breakwaters and sunken barges. Historical records indicate that this area was once dominated by reef and bedrock shoals which provided a diversified bathymetry in the

near shore zone. These shoals were covered by landfill projects which caused irreparable losses in forage, spawning and nursery habitat for many littoral fish species. Currently, the near shore area consists mainly of sand and gravel lenses spread across a fairly uniform lake bottom. There is some diversity in depth just lakeward of the beach due to a dredging project which has created a hole. However, this hole is gradually filling back in from the surrounding lake-bottom sediments and changes in water depth are quite gradual. Fish habitat is better provided by sharp changes in relief from the lake bottom. This project seeks to recreate a small percentage of what was once a diverse underwater landscape by establishing rock reefs along the lakeshore with naturally available cobble.

d. Proposed Fill Material

1) General Characteristics

Fill material may consist of submerged cobble pockets with nominal stone size of 1.2 feet. Fill materials will be free from the presence of environmental contaminants and will contain less than 5% fines.

2) Quantity

The proposed activity would require placement of 4 cobble pockets composed of natural rounded cobble.

Item	Area (sf)	Volume (cyd)	Material Specs
cobble lens 1	63.62	132	natural rounded cobble (1.2’ diameter)
cobble lens 2	63.62	132	natural rounded cobble (1.2’ diameter)
cobble lens 3	63.62	132	natural rounded cobble (1.2’ diameter)
cobble lens 4	63.62	132	natural rounded cobble (1.2’ diameter)

3) Source

All fill material for the proposed construction will be clean, inert materials obtained from a commercial supplier.

e. Proposed Discharge Site

1) Location

The proposed fill activity would occur in Lake Michigan near the shore, northeast of the breakwater structure surrounding the Ameristar casino. Proposed layout of each cobble lens is depicted in figures 14 and 15 of the feasibility report. Lens placement is planned relative to the breakwater structure and ultimate location will depend upon the final breakwater layout. Lens placement will cover sand and gravel lake bottom.

2) Size, Type, and Habitat

Four cobble lenses will be established over a rectangular polygon of 2.5 acres parallel to the breakwater structure. Each lens will be circle to elliptical in shape and cover an area of approximately 63 square feet each with a nominal stone size of 1.2 feet of naturally rounded stone. Each lens should be slopped

at a 1:1 ratio to a peaked height of no less 4 feet from the lake floor. Lenses will be positioned at a minimum depth of 12 feet to minimize the effects from wave energy and to reduce the stone sizes needed to maintain stability. The placement of the stone at a 1:1 slope ratio may encounter minor sloughing as the stones settle and the crest height may also sag slightly but neither of these issues will detract from the features success as fisheries habitat.

These cobble mounds will serve as rock reef fish habitat that may support a variety of critical life sustaining functions such as spawning and foraging habitat. The interstitial space created between the settling cobble stone will provide protection to eggs and larvae from predation. The increased surface area on the stone will also provide habitat for macroinvertebrate communities which in turn improve foraging opportunities for fishes.

3) Timing and Duration of Discharge

Construction of the rock reef habitat will not exceed one month of material placement and positioning. All material will be placed outside of sensitive fish spawning and aggregation windows as coordinated with Federal and State regulatory and management agencies (i.e. USFWS, USEPA, IDEM and IN-DNR).

f. Placement Method

Methods for material placement may vary depending upon the preferred method of the contractor while adhering to all applicable regulatory guidance and requirements. Best management practices will be used to limit any incidental impacts to the existing habitat. Methods of material placement consist of placing the cobble with a small backhoe or equivalent machinery from the existing breakwater structure and/or a floating marine platform.

II. Factual Determinations

a. Physical Substrate Determinations

1) Substrate Elevation and Slope

Elevation of the Lake Michigan bottom within the project footprint is approximately 569 to 568 NAVD88 as measured in a 2008 LiDAR survey. Within the location selected for placement of fill, the lake bottom slopes downward in the eastward direction at ratio of 1:65 and is expected to be in equilibrium with the surrounding substrates with no net movement.

2) Sediment Type

The current lake bottom is lacustrine sands and gravels. The additional fill material will contain cobble stone at a nominal size 1.2 feet in diameter. The cobble stone will be natural river-run, lake or glacially deposited cobble: smooth and well rounded. Cobble shall be composed of hard, strong, durable materials that will not slake or deteriorate on exposure to the action of water or atmosphere. Visual inspection of the material will be completed for cracks, fractures, seams, bands of minerals, deleterious materials and defects and may be rejected if found inadequate.

3) Material Movement

There would be no significant movement of fill material after construction. Newly installed cobble pockets in the near shore lake area will be installed and sized to withstand effects from erosion due to both lake currents and wave action. Minor sloughing of the 1:1 graded slope may occur which could reduce the original crest height but this will not reduce the natural resource benefits provided by the reefs.

4) Physical Effects on Benthos

Existing benthos in construction zone will be disturbed temporarily during the installation of the cobble pockets. Careful placement of the material will be used to minimize any temporary impacts. No significant adverse effects are expected. Long term increases in diversity and abundance of aquatic macroinvertebrates are expected as increased habitat diversity is added to the project location.

5) Other Effects

There would be no other significant substrate impacts.

6) Actions Taken to Minimize Impacts

Careful placement of material into the near shore, lake area will help minimize sedimentation and disturbance of existing habitat. Timing of the active construction period will exclude sensitive fish spawning and aggregation seasons in the near shore area to help minimize adverse impacts. All existing best management practices will be used during placement of the material as well.

b. Water Circulation, Fluctuation, and Salinity Determinations

1) Water

The proposed fill activity would have no significant negative impacts to water chemistry, water clarity, color, odor, taste, dissolved gas levels, nutrients, or increased eutrophication as a result.

2) Current Patterns and Circulation

The current patterns and circulation in southern Lake Michigan will not be affected by installing fish habitat in the near shore area.

3) Normal Water Level Fluctuations

The proposed fill activity would have no significant impact on normal water level fluctuations in Lake Michigan.

4) Salinity Gradients

Not applicable to freshwater environments.

5) Actions Taken to Minimize Impacts

Careful placement of material into the near lake area will be taken to minimize the temporary impacts on water circulation and fluctuation associated with the proposed activity.

c. Suspended Particulate/Turbidity Determinations

1) Expected Changes in Suspended Particulates and Turbidity in Vicinity of Fill

There would be minor increases in suspended particulates and turbidity levels in the immediate area of the proposed fill activity during construction. No permanent increases in suspended particulates or turbidity levels are expected.

2) Effects on Chemical and Physical Properties of Water Column

There would be negligible effects to light penetration and no effects to dissolved oxygen levels during construction. The placement of clean fill will not introduce metals, organics, or pathogens to the project area. Aesthetics will be temporarily affected during the construction as machinery is staged on the breakwater or floating marine platforms. Aesthetics are not expected to be impacted long term as all modifications will be below the ordinary low water datum.

3) Effects on Biota

Net beneficial effects on aquatic biota are expected to result from the restoration activities. Temporary and minor increases in turbidity or suspended particulates are expected during active construction with the proposed fill. No significant adverse impacts on aquatic biota are expected to result from the temporary, elevated turbidity or suspended particulates.

4) Actions Taken to Minimize Impacts

No significant impacts from suspended particulates or turbidity are expected to occur from this project. The placement of cobblestone pockets and woody debris will be done in a manner to minimize the disturbance of sediments to the maximum extent practicable.

d. Contaminant Determination

The proposed fill material would not introduce any new contaminants into Lake Michigan. No contamination was identified to be present on the lake bottom during the phase I HTRW investigation conducted. Additionally, bottom disturbance is not expected to release any significant amounts of existing contaminants (if any are present) through bottom disturbance in the construction zone.

e. Aquatic Ecosystem and Organism Determinations

1) Effects on Plankton

There would be no effects to light penetration or photosynthesis and other related metabolic functions in phytoplankton during construction. Minor re-suspension of particulates is not expected to impact plankton populations in the near shore lake area.

2) Effects on Benthos

Existing benthos directly beneath where materials would be placed would temporarily be covered, but the area is so small it would have insignificant effects on the macroinvertebrate and invertebrate population. These minor impacts are necessary to create improved conditions for benthic invertebrates. There are no significant adverse effects expected.

3) Effects on Nekton

Fish eggs and larvae would not be smothered by the proposed fill activity since the anticipated construction activities will occur during non-reproductive or rearing seasons. Fish and other free-swimming organisms will tend to avoid the active construction area; the construction area will be used again by those organisms soon after construction ends and overall species richness is expected to increase. Species requiring rocky substrates will directly benefit from the new habitat creation while many predatory species will benefit indirectly from the increased forage base.

4) Effects on Aquatic Food Web

Beneficial improvements to the food web are expected due to the beneficial effects the overall project will have on the macroinvertebrates richness and abundance. Fish spawning activity on the newly created reefs will also introduce another food web dynamic with increased fish eggs and larvae added to the food base.

5) Effects on Aquatic Sites

a) Sanctuaries and Refuges – none present; no significant impact
b) Wetlands – none present; no significant impact
c) Mud Flats – none present; no significant impact
d) Vegetated Shallows – are present within the adjacent breakwater but are not expected to be significantly impacted by any of the proposed fill activities.
e) Coral Reefs – not applicable to freshwater environments
f) Riffle and Pool Complexes – none present; no significant impact

6) Threatened and Endangered Species

It is not anticipated that this project would adversely affect Federal or State listed species. Coordination with Federal and State agencies during the feasibility phase of this study on project impacts to listed species has been conducted. Coordination with the Indiana Department of Natural Resources Natural Heritage Database was completed with twenty state listed vascular plants and one federally listed plant species within 0.5 miles of the project site. Additionally, federally-listed Threatened, Endangered, Proposed and Candidate Species were reviewed in the project area using the Section 7 guidance and associated tools provided on the Midwest USFWS website (see section 2.3.7 of feasibility report).

Project restoration features above the ordinary high water line could be beneficial to locally threatened, endangered and rare species such as marram grass (*Ammophila breviligulata*), sea rocket (*Cakile edentula*), Pitcher's (Dune) thistle (*Cirsium pitcheri*), black tern (*Chlidonias niger*), black crown night heron (*Nycticorax nycticorax*), osprey (*Pandion haliaetus*), Foster's tern (*Sterna forsteri*), and common tern (*Sterna hirundo*). Project features would be designed to support resting and foraging areas for migratory bird species. Project restoration features below the ordinary high water line could be

beneficial to banded killifish (*Fundulus diaphanus*), lake chub (*Couseius plumbeus*), and longnose sucker (*Catostomus catostomus*).

7) Other Wildlife

Migratory birds would greatly benefit from the restoration project as proposed.

8) Actions Taken to Minimize Impacts

General construction scheduling and sequencing would minimize impacts to reproducing macroinvertebrates and fishes.

f. Proposed Discharge Site Determinations

1) Mixing Zone Determination

A mixing zone is not applicable to this project as no violation of applicable water quality standards is expected during construction.

2) Determination of Compliance with Applicable Water Quality Standards

The proposed activity would not cause significant or long-term degradation of water quality within Lake Michigan and would comply with all applicable water quality standards. Water quality would ultimately improve as newly vegetated areas of the breakwater and beach remove open areas which attract nuisance bird species. Reduced nuisance bird species will reduce *E. coli* input via bird feces.

3) Potential Effects on Human use Characteristics

No significant impacts to municipal and private water supplies, water-related recreation, aesthetics, recreational, or commercial fisheries are expected. Temporary restriction to the breakwater pier is expected during active construction activities which are expected to last no longer than three months during placement of the fill material and plantings along the breakwater. Limiting visitor's foot traffic on the planted areas of the breakwater and the restored dune areas will be necessary to preserve the native plant communities. However recreational use of this area is currently minimal, the bathing beach and picnic area will provide ample space for recreation opportunities. No known National Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves are present.

g. Cumulative Effects on the Aquatic Ecosystem

The proposed project would restore aquatic habitat structure and function. There are no significant adverse effects expected.

h. Secondary Effects on the Aquatic Ecosystem

No significant adverse impacts on the Lake Michigan or Jeorse Park Beach ecosystems are expected as a result of the proposed activity.

III. Findings of Compliance with Restrictions on Discharge

a. No adaptation of the Section 404(b)(1) guidelines was made for this evaluation.
b. No practical alternatives are available that produce fewer adverse aquatic impacts than the proposed plan.
c. The proposed project would comply with applicable water quality standards.
d. The project is in compliance with applicable Toxic Effluent Standards under Section 307 of the Clean Water Act; with the Endangered Species Act of 1973; with the National Historic Preservation Act of 1966; and with the Marine Protection, Research, and Sanctuaries Act of 1972.
e. The proposed fill activity would have no significant adverse impact on human health or welfare, including municipal and private water supplies, recreational and commercial fisheries, plankton, fish, shellfish, or wildlife communities (including community diversity, productivity, and stability), special aquatic sites, or recreational, aesthetic, and economic values.
f. Typical erosion control best management practices and careful placement of fill material would occur to minimize construction impacts and the least environmentally damaging construction alternative was selected.
g. On the basis of the Guidelines, the proposed site for the discharge of fill material is specified as complying with the requirements of these guidelines with the inclusion of appropriate and practical conditions to minimize pollution or adverse impacts to the aquatic ecosystem.

Indiana

County Distribution of Federally-Listed Threatened, Endangered, Proposed, and Candidate Species

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For information on Indiana's federally listed species, contact
U.S. Fish and Wildlife Service, 620 S. Walker St., Bloomington, Indiana 47403-2121 or phone (812)334-426

COUNTY	SPECIES	STATUS	HABITAT
Adams	Indiana bat (*Myotis sodalis*)	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Allen	Indiana bat (*Myotis sodalis*)	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Eastern massasauga (*Sistrurus catenatus*)	Candidate	Wetlands and adjacent uplands
	Rayed Bean Mussel (*Villosa fabalis*)	Endangered	St. Joseph River
Bartholomew	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Benton	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Blackford	Indiana bat (*Myotis sodalis*)	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Boone	Indiana bat (*Myotis sodalis*)	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Brown	Indiana bat(*Myotis sodalis*)	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
Carroll	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.

COUNTY	SPECIES	STATUS	HABITAT
	Fat pocketbook (*Potamilus capax*)	Endangered	East Fork White River, Wabash River
	Sheepnose (*Plethobasus cyphyus*)	Endangered	Wabash River
Kosciusko	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Copperbelly water snake (*Nerodia erythrogaster neglecta*)	Threatened	Wooded and permanently wet areas such as oxbows, sloughs, brushy ditches and floodplain woods
	Eastern massasauga (*Sistrurus catenatus*)	Candidate	Wetlands and adjacent uplands
	Clubshell (*Pleurobema clava*)	Endangered	Tippecanoe River
	Rayed Bean Mussel (*Villosa fabalis*)	Endangered	Tippecanoe River
La Porte	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Eastern massasauga (*Sistrurus catenatus*)	Candidate	Wetlands and adjacent uplands
	Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*)	Endangered	Fens
Lagrange	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Eastern massasauga (*Sistrurus catenatus)*	Candidate	Wetlands and adjacent uplands
	Snuffbox (*Epioblasma triquetra*)	Endangered	Pigeon River
	Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*)	Endangered	Fens
Lake	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Karner blue butterfly (*Lycaeides melissa samuelis*)	Endangered	Pine barrens and oak savannas on sandy soils and containing wild lupines *(Lupinus perennis)*, the only known food plant of larvae.
	Pitcher's thistle (*Cirsium pitcheri*)	Threatened	Lakeshores; stabilized dunes and blowout areas
	Mead's milkweed (*Asclepias meadii*)	Threatened	Prairies
Lawrence	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.
	Northern long-eared bat *Myotis septentrionalis*	Proposed as Endangered	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests and woods.
	Fanshell pearly mussel (*Cyprogenia stegaria*)	Endangered	East Fork White River
Madison	Indiana bat *Myotis sodalis*	Endangered	Hibernation occurs in caves and mines, with swarming in surrounding wooded areas. Summer roosting and foraging habitat occurs in wooded stream corridors and in bottomland and upland forests and woods.

DRAFT Finding of No Significant Impact

Jeorse Park Beach Section 506 Ecosystem Restoration Project

January 2016

The U.S. Army Corps of Engineers, Chicago District (Corps), has conducted an environmental analysis of the Jeorse Park Beach project in accordance with the National Environmental Policy Act of 1969, as amended. The Corps assessed the effects of the following actions in the Detailed Project Report and Integrated Environmental Assessment, dated January 2016, for the Jeorse Park Beach Section 506 Great Lakes Fishery and Ecosystem Restoration Project, which is incorporated herein by reference:

- Invasive species plant removal over 14.8 acres of beach and dune habitat and one acre of existing breakwater;
- Dune and beach native plantings of live plugs on 14.8 acres of beach and dune habitat and one acre of existing breakwater;
- Minor geomorphic grading of the dune structures to establish native woody species and enhance dune growth and establishment and
- Construction of 4 submerged rock reef structures over 2.5 acres of Lake Michigan bottom.

The "no action" alternative along with, 19 other alternatives with varying ecosystem restoration measures were evaluated and resulted in a recommended plan. The recommended plan was identified as the National Ecosystem Restoration (NER) plan and is also the economically preferred alternative. All practicable means to avoid and minimize adverse environmental effects have been incorporated into the recommended plan. The recommended plan would not result in any impacts to federally-listed threatened or endangered species or their designated critical habitat, would have no impact to sites listed on or eligible for inclusion on the National Register of Historic Places, and would not negatively affect any wetlands or water of the U.S., nor any important wildlife habitat. Therefore, no compensatory mitigation is required.

Consistent with the National Environmental Policy Act of 1969, as amended, the Corps has assessed the environmental impacts associated with this project. The assessment indicates that this project would not cause significant effects on the quality of the human environment and have only beneficial impacts upon the ecological, biological, social, cultural, and physical resources of the Jeorse Park Beach project site as a whole. The findings indicate that the proposed action is not a major Federal action significantly affecting the quality of the human environment. Therefore, I have determined that an Environmental Impact Statement is not required.

Christopher T. Drew
Colonel, U.S. Army
District Commander
Date: _____

DRAFT

Cost Effectiveness & Incremental Cost Analysis

This section includes the 'Total and Average Cost' report that was exported from the Institute for Water Resources (IWR) planning suite software. This software was used in the cost effectiveness and incremental cost analysis of the alternative restoration plans put fourth within the Detailed Project Report. To address the noted ecosystem problems at Jeorse Park Beach, six (6) measures, including the No Action measure, were input into the IWR-Planning Suite in terms of costs and benefits. Dune and Beach (D) and Breakwater Plantings (BP) restoration measures were dependent on first initiating Invasive Plant Removal (IPR). The remaining measures including the IPR measure were considered independent and could be implemented as a standalone project. Based on the cost and benefit inputs and the dependency criteria, the IWR-Planning software generated 20 alternative combinations for ecosystem restoration. The 'Total and Average Cost' report provided here details the costs and habitat units associated with each of the 20 alternative plans. The cost effectiveness analysis was used to ensure that certain alternatives would be screened out if they produced the same amount or less output at a greater cost than other alternatives with a lesser cost. Twenty (20) alternative combinations were analyzed for cost effectiveness. An incremental cost analysis was performed on the six (6) Best Buy Plans identified from the cost effectiveness analysis:

- Alternative 1 – No Action Plan
- Alternative 2 – (RR) Rock Reef Habitat
- Alternative 3 – (IPR) Invasive Plant Removal, (BP) Breakwater Plantings
- Alternative 4 – (IPR) Invasive Plant Removal, (D) Dune and Beach Plantings, (BP) Breakwater Plantings
- Alternative 5 – (IPR) Invasive Plant Removal, (D) Dune and Beach Plantings, (BP) Breakwater Plantings, (RR) Rock Reef Habitat
- Alternative 6 – (IPR) Invasive Plant Removal, (D) Dune and Beach Plantings, (BP) Breakwater Plantings, (RR) Rock Reef Habitat, (BWM) Breakwater Modification