Data Collected for NWCA

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR
VEGETATION • Collected from five systematically placed 100 m^2 (10x10m) plots in the 0.5 ha Assessment Area	Vascular Species Presence and Cover	Cover, presence, and height data for each vascular plant species observed in each Veg Plot Species presence data collected in nested quadrats in the SW and NE corner of each Veg Plot	• Plant Species Name • Percent Cover • Predominant Height Class • Presence in nested quadrat	VMMI (biological condition) Nonnative Plant Stressor Index (biological indicator of stress)
	Vegetation and Ground Surface Attributes	Field observations of vegetation and ground surface attributes for each Veg Plot	• Percent Cover Vascular Strata • Percent Cover Non-Vascular Taxa • Water Cover and Depth • Bare ground and litter	
	Snag and Tree Counts / Cover	Field observations of snag and tree attributes for each Veg Plot	• Snag Count by Diameter Class • Tree Species Name • Tree Species Cover by Height Class	

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR

SOIL
 	
• Soil profile description from a systematically identified location associated with a Vegetation Plot
  ○ 2011 – 4 locations by outermost veg plots
  ○ 2016 – 1 location closest to Assessment Area center
 	
• Soil samples collected for each horizon for laboratory analyses
  ○ 2011 – Most "representative" of the 4 soil profile locations
  ○ 2016 – 1 location closest to Assessment Area center
	Soil Morphology	Morphological description of soil profile
		
		Depending on site conditions, profile was described in situ or in a profile extracted by shovel, auger, or King Sampler
		
		2011 – Four soil pits described to 60 cm; one soil pit selected as the Representative Soil Pit for bulk density and chemistry sampling and described to 125 cm
		
		2016 – One soil pit described to 100 cm
			Site/Soil Pit Information:
			• Soil sampling location, proximity to Vegetation Plot
			• Presence of inundated or saturated soil
			• Hydrogen sulfide odor (if soil was saturated)
			• Initial and oxidized matrix color (if soil was saturated)
			• Soil Pit Depth (depth of description)
			• Impenetrable layers
			• Hydric Soil Field Indicators
			• Depth to water table
			
			Horizon Data:
			• Horizon name
			  ○ completed by NRCS Soil Scientist post-sampling if a soil scientist was not in the field
			• Depth to lower boundary
			• Presence of abrupt lower boundary
			• Soil texture (Peat, Mucky Peat, Muck, Sandy, Loamy/Clayey, Mucky Mineral)
			• % Rock fragments
			• % Roots
			• Soil matrix color (moist)
			• Redoximorphic features
			• % Masked sand grains (if Sandy)
			• Organic features
			• Mottles (non-redox)	

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR
	Soil Chemistry	2011 – Collected from the Representative Soil Pit, every horizon ≥8 cm to a depth of 125 cm 2016 – Collected from every horizon to a depth of 100 cm	• Particle size (PSDA), < 2mm • $CaCO_3$, < 2mm • $CaCO_3$, < 20 mm • Carbon, total • Nitrogen, total • Sulfur, total • pH • Cation Exchange Capacity (CEC) • Base cations (Ca^{2+}, K^{+}, Mg^{2+}, Na^{+}) • Ammonium Oxalate Extraction (Al, Fe, Mn, P, Si) • Electrical Conductivity • Dithionite-Citrate Extraction (Al, Fe, Mn) • Olsen Phosphorus • Mehlich Phosphorus • Trace Elements (Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, P, Pb, Sb, Se, Sn, Sr, V, W, Zn)	Heavy metal index (chemical indicator of stress) Soil phosphorus (chemical indicator of stress)
	Soil Bulk Density	Triplicate cores of known volume were collected using an open-ended-3-inch diameter sharpened steel cylinder 2011 – Collected from the Representative Soil Pit, every horizon ≥8 cm to a depth of 60 cm 2016 – Collected from every horizon ≥8 cm to a depth of 60 cm	• Bulk Density	
	Standard Depth Soil Core (2016)	One homogenized sample representing 0-10 cm collected from three evenly spaced points in undisturbed area within a 1.0 to 1.5 m radius of the Soil Pit	All soil chemistry analyses (see above)	
	Soil Isotope	One homogenized sample representing 0-10 cm collected from three evenly spaced points in undisturbed area within a 1.0 to 1.5 m radius of the Soil Pit	Research indicator (data not currently available)	

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR
	Sediment Enzyme (2011 only)	One homogenized sample representing 0-10 cm collected from three evenly spaced points in undisturbed area within a 1.0 to 1.5 m radius of the Soil Pit	• Dehydrogenase (Respiratory electron transport system) • α-d-galactosidase (C acquisition) • L-alanine aminopeptidase (C acquisition) • β-d-galactosidase (C acquisition) • β-d-glucosidase (C acquisition) • Cellobiohydrolase (C acquisition) • β-d-xylosidase (C acquisition) • β-N-acetylglucosaminidase • l-alanine aminopeptidase (N acquisition) • l-leucine aminopeptidase (N acquisition) • Acid phosphatase (P acquisition) • Polyphenol oxidase (C acquisition)	
BUFFER CHARACTERIZATION • Data collected from twelve 100 m^2 plots arrayed along cardinal directions from the edge of the Assessment Area out to 135 m^2 from the Assessment Area center, and one 100 m^2 plot at the Assessment Area center	Natural Cover	Visual assessment of habitat structure within each Buffer Plot	• Tree Canopy Type • Cover by Vegetation Strata • Other Natural Cover – bare ground, litter, rock, water, submerged vegetation	Vegetation alteration (physical indicator of stress) Hydrologic alteration (physical indicator of stress)
	Stressors	Observations of hydrology alterations, habitat/vegetation stressors, or land use activities within each Buffer Plot that may have a negative influence on Assessment Area condition	• Residential and Urban Stressors • Hydrology Stressors • Agricultural and Rural Stressors • Industrial Development Stressors • Habitat/Vegetation Stressors	
	Targeted Alien Plant Species	Crews record the presence of 24 target alien plant species within each Buffer Plot. Plant species selected based on widespread distribution, importance and ecological impact, and ease of identification for non-botanists	• Targeted Alien Plant Species	

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR

HYDROLOGY
 	
• Documentation of observations of hydrology characteristics and evidence of hydrologic alterations within the Assessment Area
	Wetland Hydrology	Prior to sampling, crew reviews pertinent hydrology information (e.g., sources of water, tide charts, aerial images, recent weather conditions). At the site, crew scans entire Assessment Area to document hydrology characteristics and features	• Weather conditions
			  ○ Time of sampling
			  ○ Prior week
			• Tidal Stage at sampling (if applicable)
			• Water Sources and Outflows
			• HGM wetland type
			• USACOE Wetland Hydrology Indicators
				Hydrologic alteration (physical indicator of stress)

	Hydrologic Alteration	Evidence of alterations of wetland hydrology within the Assessment Area	• Hydrologic Stressors (presence and ranking)	

SURFACE WATER
 	
• If surface water present within the Assessment Area, crew records observations about depth and extent, and water body characteristics
 	
• Water sample collected for laboratory analyses.
  ○ 2011 – location nearest to Point where depth > 15 cm
  ○ 2016 – location nearest to Assessment Area center with sufficient depth to collect clean sample
 	
• Samples are kept on ice and shipped within 24 hours of collection
	Algal toxin	125 ml plastic bottle with screw lid
		
		2011 – composite sample included water from algae taxonomic sample (water, sediment, epiphytic vegetation)
		
		2016 – water column only
			• Microcystin (ug/L)	Algal toxin (chemical indicator of stress)

	Chlorophyll-a	1L amber bottle Filtered on site (GF/F 0.7um) Filter placed in sterile 50 ml centrifuge tube with screw cap	• Chlorophyll a (ug/L in sample)	
	Water chemistry	1L cubitainer	• Conductivity (uS/cm) • pH (laboratory) • Ammonia (mg N/L) • Nitrate-nitrite (mg N/L) • Nitrogen, total (mg N/L) • Phosphorus, total (ug P/L) • Turbidity (NTU) – Added for 2016 • Dissolved Organic Carbon (mg C/L) – Added for 2016 • Sulfate (mg SO4/L) – Added for 2016 (freshwater only) • Chloride (mg Cl/L) – Added for 2016 (freshwater only)	

INDICATOR CATEGORY / GENERAL METHODS	INDICATOR COMPONENTS	GENERAL COLLECTION METHODS	DATA COLLECTED	REPORT INDICATOR
USA-RAM (2011 only) • Rapid Assessment Method developed for NWCA 2011 to assess overall condition and stress • Utilizes the same Assessment Area and Buffer Layout as the NWCA protocols	Assessment of the Buffer	Desktop and in-field observations of the buffer area extending 100 m from the Assessment Area	• Percent of Assessment Area having Buffer (natural land cover) • Buffer (natural land cover) Width • Stress to the Buffer Zone	
	Physical Structure	Visual assessment of the Assessment Area	• Topographic Complexity • Patch Mosaic Complexity	
	Biological Structure	Visual assessment of the Assessment Area	• Vertical Complexity • Plant Community Complexity	
	Assessment of Stressors in the Assessment Area	Visual assessment of the Assessment Area	• Stress to Water Quality • Alterations to Hydroperiod • Habitat/Substrate Alterations • Percent Cover of Invasive Plant Species • Vegetation Disturbance	