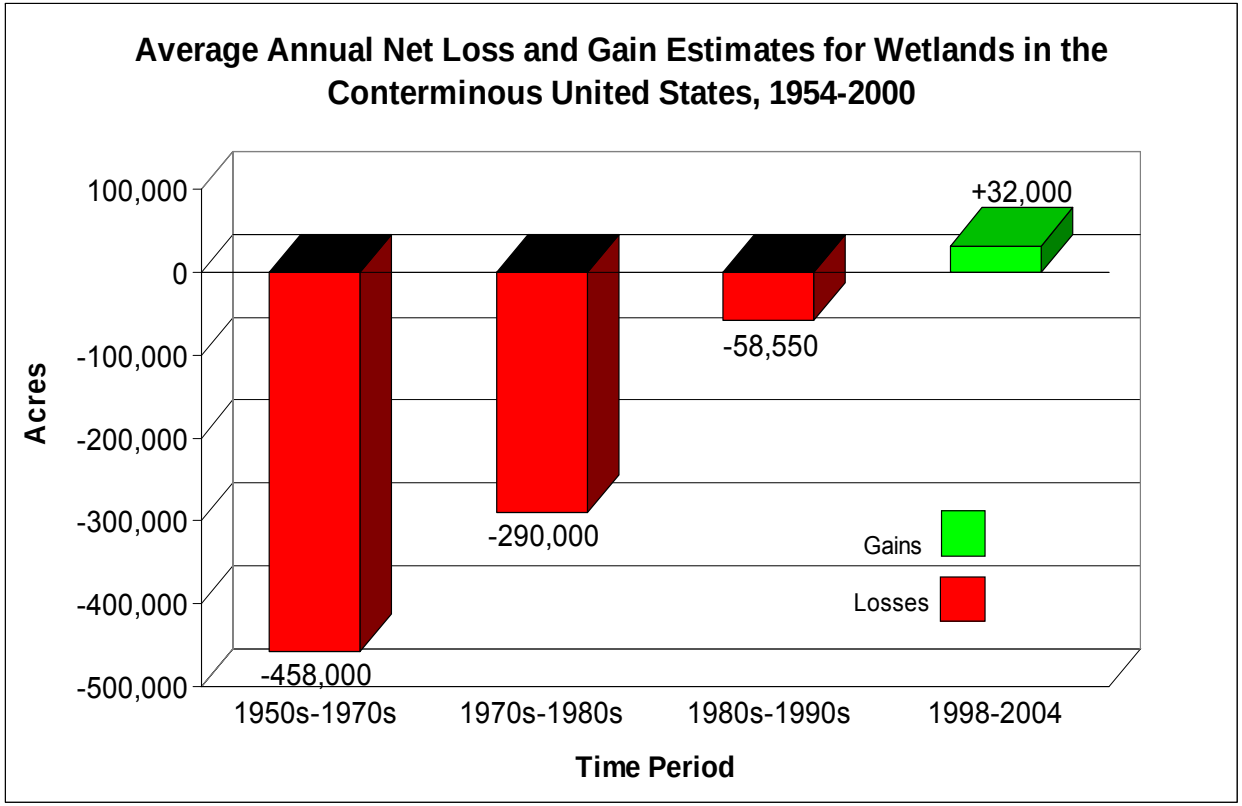
2011 National Wetland Condition Assessment (NWCA)

Upcoming EPA National Aquatic Resource Survey for Wetlands

US EPA Wetlands Division,
Office of Research and Development,
Region 2

What is the Condition of the Nation's Wetlands?

Existing sources of information do not provide a sufficient answer to this question.



2005 FWS Wetland Status & Trends Report
(Trends in Wetland Acreage)

2004 CWA 305b Report

- 10 States reported
- 1.8 million acres
- 1.5% of the estimated 107 million acres in the conterminous United States

National Wetland Condition Assessment Goals

1. Produce a national report that describes the ecological condition of the nation's wetlands.

2. Help States and Tribes implement wetland monitoring and assessment programs.

3. Advance the science of wetlands monitoring and assessment.

2011 National Wetland Condition Assessment

Goals	Objectives
National Report	• For the entire nation and within ecoregions • By wetland class for the entire nation • By state or tribal area (provided the state or tribe invests additional resources to conduct an intensification study)
State and Tribal Capacity	• Develop scalable methods and indicators • Provide field training and equipment • Encourage/support state or tribal intensification studies • Share survey data, including reference data • Develop plans for continued monitoring, post survey, to identify wetland condition trends through time
Advance The Science	• Integrate reporting of wetland acreage with condition assessment • Consider how wetland condition impacts the delivery of ecosystem services. • Consider how climate change will affect wetland condition

EPA Long-term Goal 2.3 : **IMPROVE WATER QUALITY**
EPA Long-term Goal 4.3 : **PROTECT, SUSTAIN, AND RESTORE THE HEALTH OF CRITICAL NATURAL HABITATS AND ECOSYSTEMS** .

Target Population

All wetlands of the conterminous U.S. including tidal and non-tidal wetted areas that have rooted vegetation and/or open water ≤ 1 meter in depth.

FWS Status and Trend Category	Common Examples	
Estuarine Intertidal Emergents	■ Saltwater marsh	■ Brackish marsh
Estuarine Intertidal Forested/Shrub	■ Mangrove forest ■ Swamp tupelo	
Palustrine Forested	■ Bottomland hardwoods ■ Cypress swamps	■ Vernal pools
Palustrine Shrub	■ Bogs ■ Pocosins	■ Bayberry fens ■ Natural cranberry bogs
Palustrine Emergents	■ Lacustrine/Riverine fringe ■ Freshwater marsh	■ Fens ■ Wet Meadows
Palustrine Unconsolidated Bottom / Aquatic Bed (*some subcategories***)**	■ Depressional wetlands ■ Prairie potholes / kettles ■ Other natural ponds	■ Urban/residential ponds ■ Other created ponds with natural characteristics
Palustrine Farmed (*not currently in crop production***)**	■ Agricultural fields that currently have characteristics of natural wetlands	

Survey Design

Two Stage Design

- The first stage is an area frame design stratified by state and physiographic region where the area frame consists of 2 mile by 2 mile plots that cover the 48 contiguous states.

- The first stage results in the identification of land cover types focused on wetland types within each 2 mile by 2 mile plot selected (sample size is approximately 5048 plots).

Survey Design

- The second stage is a Generalized Random Tessellation Stratified (GRTS) survey design for an area resource applied to the stage one sample plots.
- The second stage survey design is a stratified design with unequal probability of selection based on area within each stratum.
- Stratification is by state and unequal probability of selection is by seven (7) wetland categories.
- The design includes three panels.
  - Revisit: identifies sites that are to be visited twice.
  - Base: identifies remaining sites to be visited.
  - Over: identifies sites that will be used as replacement sites if base sites are not able to be sampled

Survey Design

- **Stratification and unequal probability categories:**
- Stratification is by state and unequal probability of selection is by seven (7) wetland type categories. Allocation of sites by state and wetland type categories was completed by solving a quadratic programming problem that minimized the sum of the squared deviations of the expected sample size minus proportional allocation of sites by wetland type based on state area within each wetland type subject to constraints that (1) the sum of the expected sample sizes for a state within a wetland type was the following E2EM=128, E2SS=127, PEM=129, PSS=129, PFO=129, Pf=129, and PUBPAB=129, (2) the minimum number of sites for a state was 8, (3) the maximum number of sites within a state for E2EM or E2SS was 13 (coastal states), (4) the maximum number of sites within a state for PEM, PSS, PFO, Pf, or PUBPAB was 10 and (5) the minimum number of sites was greater than or equal to zero for each wetland type and state combination. This approach ensured that the sample size for the seven wetland types was sufficient for national reporting, each state received a minimum number of sites (which also improved the national spatial balance of the sites) and otherwise proportionally allocated the sites by area within a wetland type.

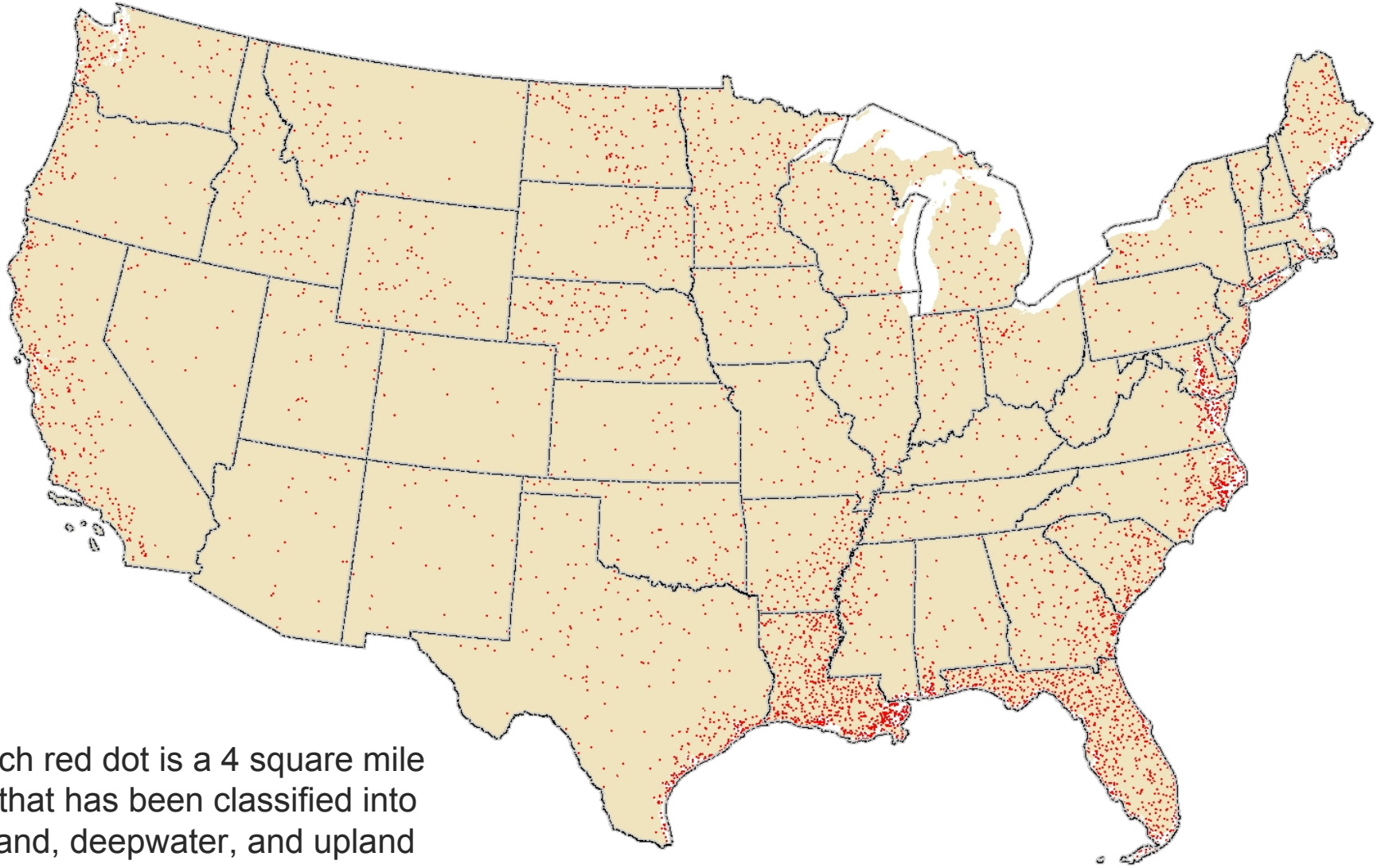
Sampling Frame

- **U.S. FWS Status and Trends Plots (2 mile x 2 mile)**
  - Tracks trends in wetland acreage since the 1970's
  - Most contemporary, nationwide dataset (recent imagery)
  - Most accurate and consistent across states (highest probability of mapped wetland actually being a wetland

NWCA Sampling Frame

(Map for Selecting Sample Sites)

U.S. Fish & Wildlife Service “Wetland Status and Trends” Plots

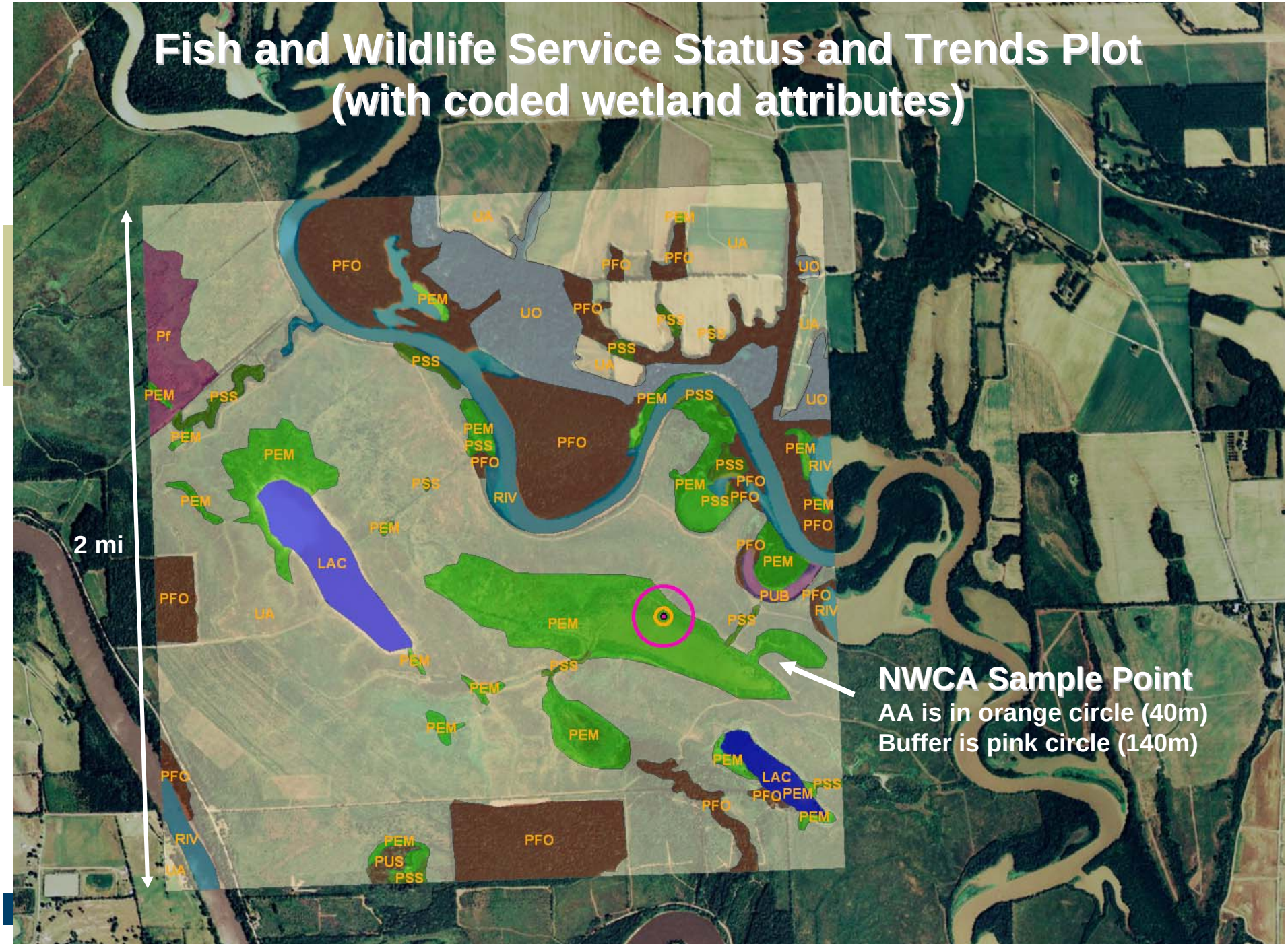


* Each red dot is a 4 square mile plot that has been classified into wetland, deepwater, and upland categories.

Wetland Classes in NWCA

- E2EM – Estuarine Intertidal Emergent
- E2SS – Estuarine Intertidal Forested/Shrub
- PUB/PAB – Palustrine Unconsolidated Bottom/ Palustrine Aquatic Bed
- PFO – Palustrine Forested
- PSS – Palustrine Scrub/Shrub
- PEM – Palustrine Emergent
- Pf – Palustrine farmed

Fish and Wildlife Service Status and Trends Plot (with coded wetland attributes)



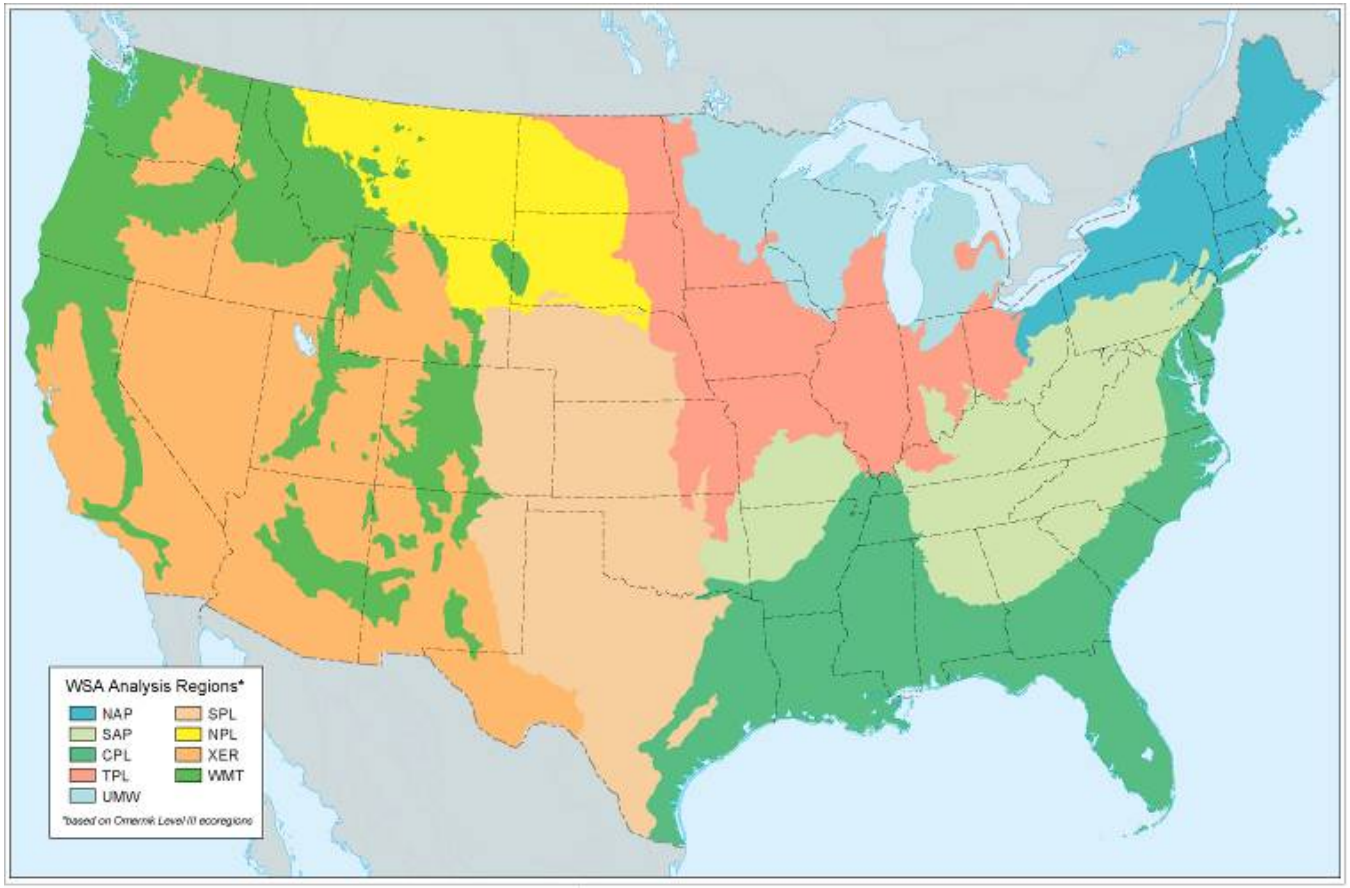
Reporting Units

- The survey design will allow EPA to report nationally on
  - all wetlands in the target population
  - all wetlands in the target population by Status and Trends type and Hydrogeomorphic (HGM) wetland class
  - all wetlands in the target population occurring in coastal watersheds.

- EPA expects to report results by
  - Combined Level III Omernik Ecoregions (USEPA 2006b)
  - other geographically-derived assessment units that have yet to be determined.
    - These may be a “political” unit (i.e., state or territory) or at a smaller scale, such as a watershed within the political unit.

- States and Tribes that are able to invest additional resources will have the opportunity to leverage EPA design and logistical support to produce a state or tribal scale assessment.

Level 3 Ecoregions



Survey Background

- 996 samples nationally
  - 900 Probability Sites + 96 QA
- Standard field and lab protocols for core indicators
  - National QA program and data management
  - Nationally consistent and regionally relevant data interpretation and reports
- Money allocated based on the number of sampling sites that fall in jurisdiction

Summary of Draft Indicators and Field Methods

Acknowledgments:
Mary Kentula and Teresa Magee, EPA ORD
Gregg Serenbetz, Chris Faulkner, Elizabeth Riley, EPA OW
NWCA Indicator Workshop Participants
National Wetland Monitoring and Assessment Work Group
Contractor Support

1.5 NWCA REFERENCE DOCUMENTS

The complete documentation of overall project management, design, methods, rationale and standards for the NWCA is contained in eight companion documents:

Ecological Indicators for the 2011 National Wetland Condition Assessment (EPA- 841 -10-xxx): This document contains the rationale for indicators and metric selected for inclusion in the National Wetland Condition Assessment (NWCA).

National Wetland Condition Assessment: Quality Assurance Project Plan (EPA-841-XXXXX):
This document contains elements of the overall project management, data quality objectives, measurement and data acquisition, and information management for NWCA.

National Wetland Condition Assessment: Site Evaluation Guidelines (EPA-841-XXXXXX): This document contains an overview of the process involved in locating a sampling site, evaluating the site to determine if it should be sampled, and selecting appropriate alternate sites when necessary.

National Wetland Condition Assessment: Field Operations Manual (EPA-841-XXXXXX): This manual describes field protocols and daily operations for use by field crews during the National Wetland Condition Assessment (NWCA).

National Wetland Condition Assessment: Laboratory Operations Manual (EPA-841-XXXXXX): This manual describes laboratory protocols and is for use by laboratory personnel for samples associated with the National Wetland Condition Assessment (NWCA).

National Wetland Condition Assessment: USA RAM Field Operations Manual (EPA-841-XXXXXX): This document describes the procedures for completing the Level 2, Rapid Assessment Method component of the NWCA field protocol.

National Wetland Condition Assessment: Data Analysis Plan (EPA-841-XXXXXX): This document outlines the questions we intended to pursue while analyzing data for the National Wetland Condition Assessment (NWCA).

State Safety Plans: These documents are created by the participating States and Tribes for use during the National Wetland Condition Assessment (NWCA). They are based on state or tribal safety procedures and not provided by EPA.

Wetland Assessment Area

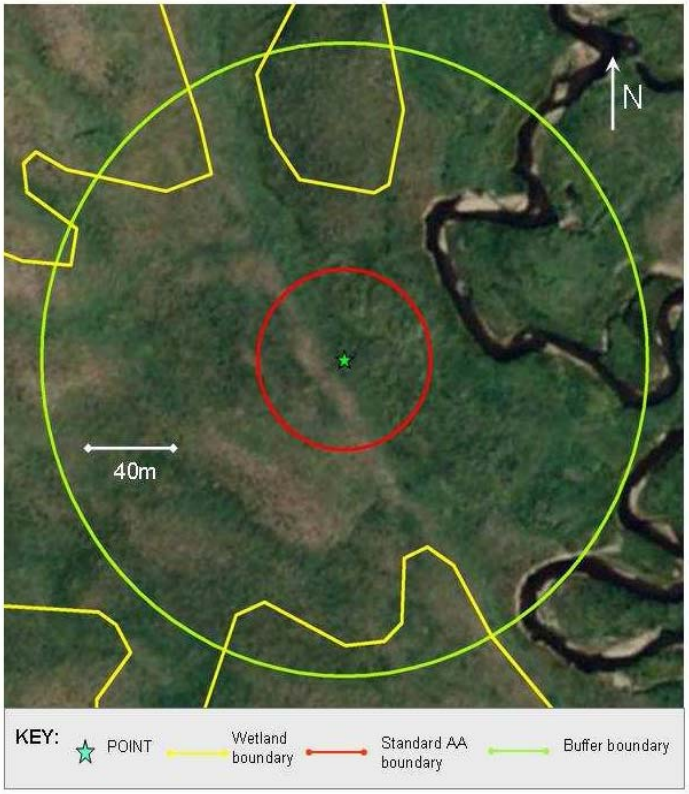


Figure 3.1. Example of Standard AA Layout depicted on the aerial photo from the site packet.

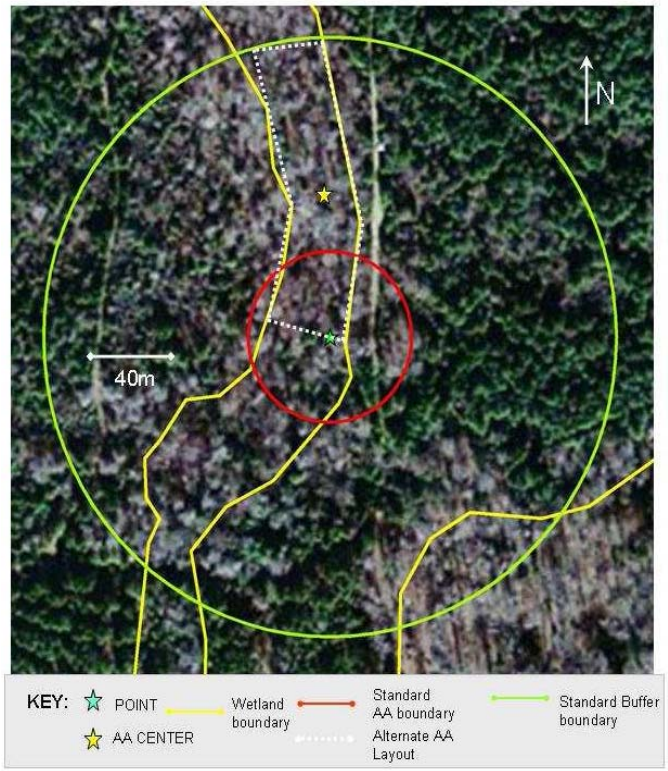
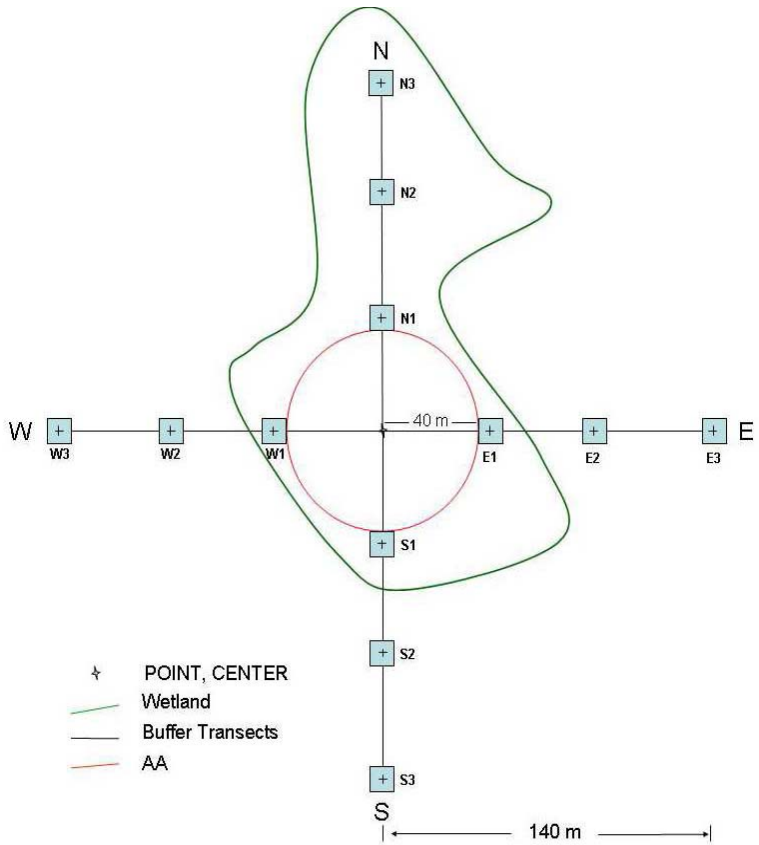
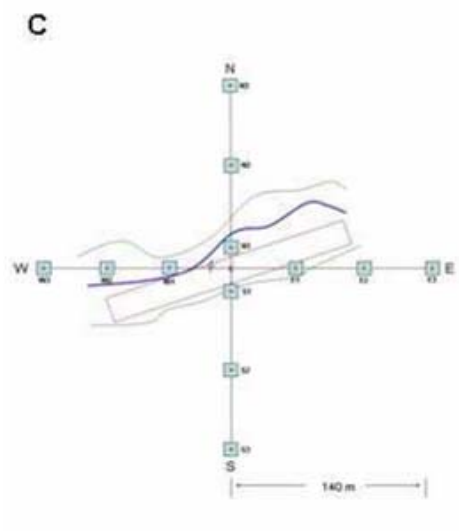


Figure 3.2. Example of Alternate Layout 2a depicted on the aerial photo of the site packet with the AA adjusted to account for the shape of the wetland (see Section 3.1.2.2.3).

POINT- the location defined by the lat/long coordinates generated by the NWCA sample draw

Buffer Area


N
N3
N2
N1
W
W3
W2
W1
40 m
E1
E2
E3
E
S1
S2
S3
S
140 m
POINT, CENTER
Wetland
Buffer Transects
AA


C
N
W
E
S
140 m

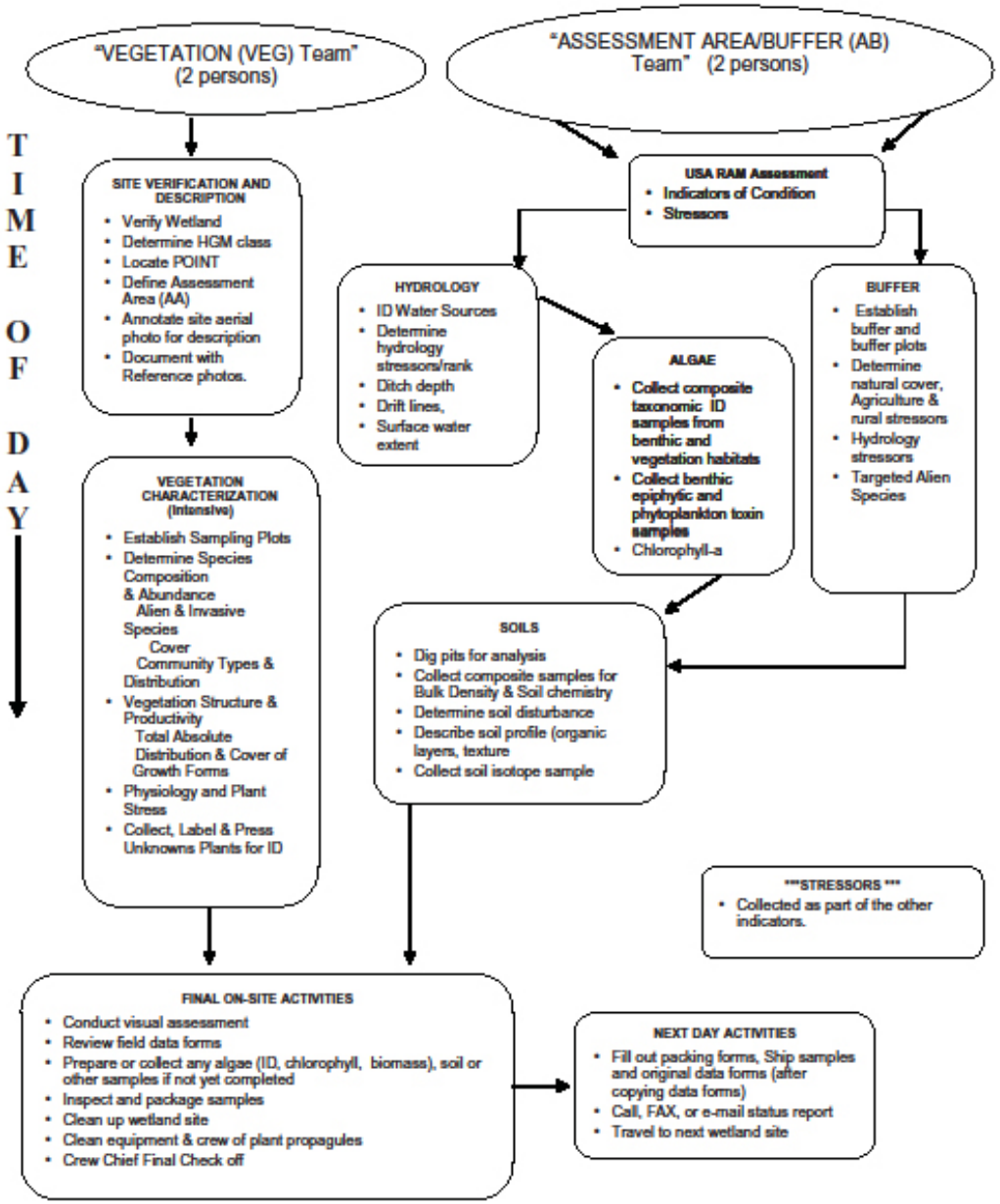


Figure 2-1 General One Day Sequence of Sampling Activities Conducted Onsite. Sampling period for each indicator is based on

Field Efforts

- **Vegetation (VEG) Team**-- composed of a Botanist/Ecologist and a Botanist Assistant whose primary responsibilities include:
  - Laying out the Assessment Area (AA) and vegetative plots
  - Collecting plant ecological data
    - species identities, presence and cover of individual species
    - presence and cover of vertical vegetation strata
    - counts of larger trees
  - Collecting other information related to vegetation condition
  - Collecting and processing plant specimens.

- **Assessment Area-Buffer (AB) Team**-- composed of two crew members, whose primary responsibilities include:
  - Collecting biological, water quality, hydrology, soils and stressor data following the FOM and USA RAM protocols
  - Collecting and processing soil, algae and water chemistry specimens.

- **Index Period**-- the peak growing season when most vegetation is in flower or fruit.
  - Minimizes seasonal phenological variability and
  - enhances plant species identification accuracy

Field Efforts

Table 2-2. Range of times for in the field activities. Crew comprised of two teams, the Vegetation (Veg) team and the Assessment area/Buffer (AB) team

Activity	Team	Estimated Time to Complete Activity	
Site Verification/ POINT & CENTER Description & Location/ AA set up	Veg	2 people,	0.5 hr
Vegetation Sampling	Veg	2 people,	8 hr
Soil Sampling	AB	2 people	4 hr
Hydrology	AB	1 person,	1 hr
Collecting and Processing Algae	AB	1 person,	0.75 hr
Buffer Set up & Sampling	AB	1-2 persons,	1 hr
USA Rapid Assessment Methodology	AB	1-2 person,	1 hr
Stressor Assessment	AB	1 person,	1 hr
Sample Tracking and Packing	Veg/AB	2 persons,	1 hr
SUMMARY	35 person-hrs*	9 hrs per team	

* Equals about 9 hours /crew member.

Assessment of Wetland Physical Habitat, Buffer and Stressors

- Test a Rapid Method to:
  - Assess wetland physical habitat and identify stressors.
  - Diagnose indicator performance based on buffer condition.
  - Provide States and Tribes with an easily adapted tool.

USA Rapid Assessment Method Attributes
Landscape
Buffer
Hydrology
Physical Structure
Biological Structure

USA-RAM

Key Assumptions

- Level 2 assessments provide different information than Levels 1 or 3; Level 2 is about overall site condition.
- Wetland condition reflects functions and services (aquatic life use).
- Condition can be assessed based on visible indicators of form, structure, landscape context, and stress.
- Larger wetlands with more complex form and structure, and having less stress, tend to provide more kinds and/or higher levels of aquatic life use.
- At landscape scales, as the total wetland area and/or the diversity of wetland form and structure increase, the levels and kinds of aquatic life use also increase. This can be depicted in a Landscape Profile.

USA-RAM

CONDITION INDEX

Attribute	Metric
Landscape (at ST Plot scale) Possible points 2-20	**1. Wetland Abundance** Total acres of all wetland types
	2. Landscape Connectivity Ratio of total area to total edge (SDI)
Buffer (at AA scale) Possible points 2-20	**3. Buffer Extent** Percent of AA boundary having buffer
	4. Buffer Width Average buffer width
Hydrology (at AA scale) Possible points 2-20	**5. Hydroperiod** Height of bathymetric low re OHW; percent of local tidal range
	6. Hydrological Connectivity Extent to which water can access and drain adjacent uplands
Physical Structure (at AA scale) Possible points 2-20	**7. Topographic Complexity** Coefficient of height variation along the N-S axis of AA
	8. Patch Type Diversity Percent possible based on checklist of expected patch types
Biological Structure (at AA scale) Possible points 2-20	**9. Vertical Complexity** Percent of AA with overlapping plant strata
	10. Plant Community Complexity Number of co-dominant species

USA-RAM

STRESS INDEX

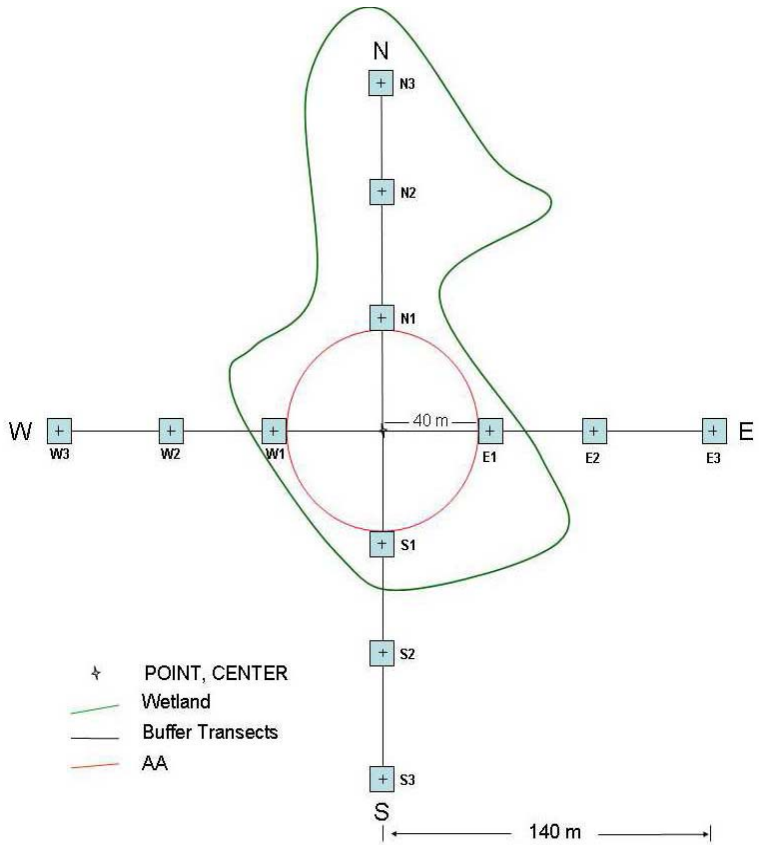
Landscape (ST Plot scale) Possible points 2-20	**1. Land Use** Percent developed (USGS data)
	2. Climate Change Sensitivity Ratio of mean annual precipitation to potential evapotranspiration
Buffer (AA scale) Possible points 2-20	**3. Adjacent land use** Percent developed within 100 m of AA
	4. Buffer Condition Percent possible sources based on checklist of expected stressors
Hydrology (ST Plot & AA scale) Possible points 2-20	**5. Water Source** Percent possible sources based on checklist (dams, diversions, etc)
	6. Hydromodification Percent possible sources based on checklist (pumps, levees, etc)
Physical Structure (AA scale) Possible points 2-20	**7. Ground Disturbance** Percent possible sources based on checklist (grazing, mining, etc)
	8. Stressor Diversity Percent possible stressors within 200 m of AA based on checklist
Biological Structure (AA scale) Possible points 2-20	**9. Biological Invasion** Percent of co-dominant plant species that are non-native
	10. Vegetation Disturbance Percent possible sources based on checklist (veg control, planting, etc).

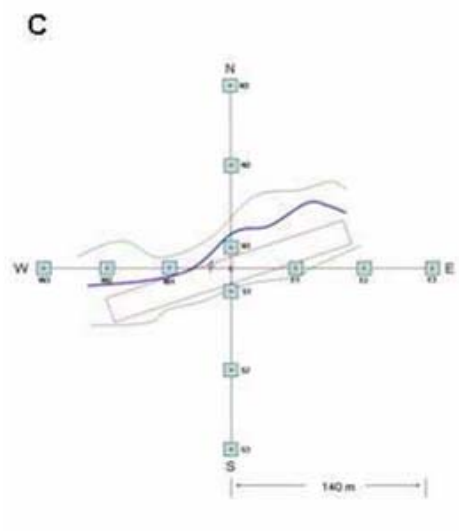
USA-RAM

Site Categorization

High Condition/Low Stress	A: Good/Intact
High Condition/Medium Stress Medium Condition/Low Stress Medium Condition/Medium Stress	B: Fair/Recovering
Medium Condition/High Stress Low Condition/Low Stress Low Condition/Medium Stress	C: Poor/Restorable
Low Condition/High Stress	D: Degraded

Buffer Area


N
N3
N2
N1
W
W3
W2
W1
40 m
E1
E2
E3
E
S1
S2
S3
S
140 m
POINT, CENTER
Wetland
Buffer Transects
AA


C
N
W
E
S
140 m

Buffer Assessment

Team Initials:_____ **Form B-1: Buffer Natural Cover Strata** Reviewed by:_____

Site ID: NWCA11-_____ Date: ___ ___/___ ___/___ ___ ___ ___ Page ____ of _____

Vegetation Strata: **Canopy Type and Vegetative Cover at 12 Buffer Plots**	May circle more than one: D = Deciduous C = Coniferous E = Broadleaf Evergreen N = None	Circle one: 0 = Absent 1 = Sparse (<10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (> 75%)

N1 Canopy Type	D C E N
Big Trees (> 0.3 m DBH)	0 1 2 3 4
Small Trees (< 0.3 m DBH)	0 1 2 3 4
Woody Shrubs (0.5m-5m), Saplings	0 1 2 3 4
Woody shrubs (<0.5m)	0 1 2 3 4
Non-woody Herbs, Grasses, and Forbs	0 1 2 3 4
Bare dirt, duff	0 1 2 3 4
Bedrock	0 1 2 3 4
Water	0 1 2 3 4
Wetland Vegetation	0 1 2 3 4

N2 Canopy Type	D C E N
Big Trees (> 0.3 m DBH)	0 1 2 3 4
Small Trees (< 0.3 m DBH)	0 1 2 3 4
Woody Shrubs (0.5m-5m), Saplings	0 1 2 3 4
Woody shrubs (<0.5m)	0 1 2 3 4
Non-woody Herbs, Grasses, and Forbs	0 1 2 3 4
Bare dirt, duff	0 1 2 3 4
Bedrock	0 1 2 3 4
Water	0 1 2 3 4
Wetland Vegetation	0 1 2 3 4

N3 Canopy Type	D C E N
Big Trees (> 0.3 m DBH)	0 1 2 3 4
Small Trees (< 0.3 m DBH)	0 1 2 3 4
Woody Shrubs (0.5m-5m), Saplings	0 1 2 3 4
Woody shrubs (<0.5m)	0 1 2 3 4
Non-woody Herbs, Grasses, and Forbs	0 1 2 3 4
Bare dirt, duff	0 1 2 3 4
Bedrock	0 1 2 3 4
Water	0 1 2 3 4
Wetland Vegetation	0 1 2 3 4

Buffer Sample Plot Coordinates

Buffer Plot	**Latitude North** (Center of Buffer Plot – Decimal Degrees)	**Longitude West** (Center of Buffer Plot – Decimal Degrees)
N1		
N2		
N3		
E1		
E2		
E3		
S1		
S2		
S3		
W1		
W2		
W3		

Team Initials:_____ **Form B-2: Buffer Stressors Form** Reviewed by:_____

Site ID: _____ Date: ___ ___/ ___ ___/ ___ ___ ___ ___ Page: _____ of _____

Hydrology Stressors					Habitat/Vegetation Stressors				
STRESSOR	TALLY		Total	BUFFER PLOTS	STRESSOR	TALLY		Total	BUFFER PLOTS
Ditches, Channelization	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Forest Clear Cut	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Dike/Dam/Road/RR Bed (impede flow)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Forest Selective Cut	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Water Level Control Structure	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Tree Plantation	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Excavation, Dredging	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Tree Canopy Herbivory (insect)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Fill/Spoil Banks	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Shrub Layer Browsed (wild or domestic)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Freshly deposited sediment (unvegetated)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Heavily-Grazed Grasses (overall <3 in.high)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Soil Loss/Root Exposure	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Recently Burned Forest Canopy	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Wall//Riprap	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Recently Burned Grassland (blackened)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Inlets, Outlets	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Herbicide/Defoliant Use	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Point source/Pipe (effluent or stormwater)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Mowing/Shrub Cutting	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Impervious surface input (sheetflow)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Trails	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Road - gravel	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Soil compaction (animal or human)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Road – two lane	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Offroad vehicle damage	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Road – four lane	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Soil erosion (from wind, water, or overuse)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Other _____ (e.g., weir, drain tiles)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Other _____	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3

Team Initials:_____ **Form B-2: Buffer Stressors Form (continued)** Reviewed by:_____

Site ID: _____ Date: ___ ___/ ___ ___/ ___ ___ ___ ___ Page: _____ of _____

Agricultural and Rural Stressors					Residential, Urban, and Industrial Development				
STRESSOR	TALLY		Total	BUFFER PLOTS	STRESSOR	TALLY		Total	BUFFER PLOTS
Pasture/ Hay	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Golf Course	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Range	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Lawn/Park	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Row Crops	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Suburban Residential	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Fallow Field (recent – resting row crop field)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Parking Lot/Pavement	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Fallow Field (old –grass, shrub, or tree regrowth)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Urban/Multifamily	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Nursery	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Commercial/Industrial	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Dairy	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Landfill	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Orchard	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Trash/Dumping	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Confined Animal Feeding	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Gravel Pit	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Rural Residential	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Oil Field/Gas Wells	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Irrigation	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Mine (surface)	___ None			ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3

Targeted Alien Species (Presence/Absence in Buffer Sample Plots) **SPECIES NOT FINAL**								
Reed Canary Grass	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Canada Thistle	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Leafy Spurge	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Garlic Mustard	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Purple Loosestrife	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Giant Reed	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Cheat Grass	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Himalayan Blackberry	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Common Reed	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3
Poison Hemlock	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Japanese Knotweed	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3	Kudzu	___ None	ON1 ON2 ON3 OE1 OE2 OE3 OS1 OS2 OS3 OW1 OW2 OW3

Wetland Assessment Area

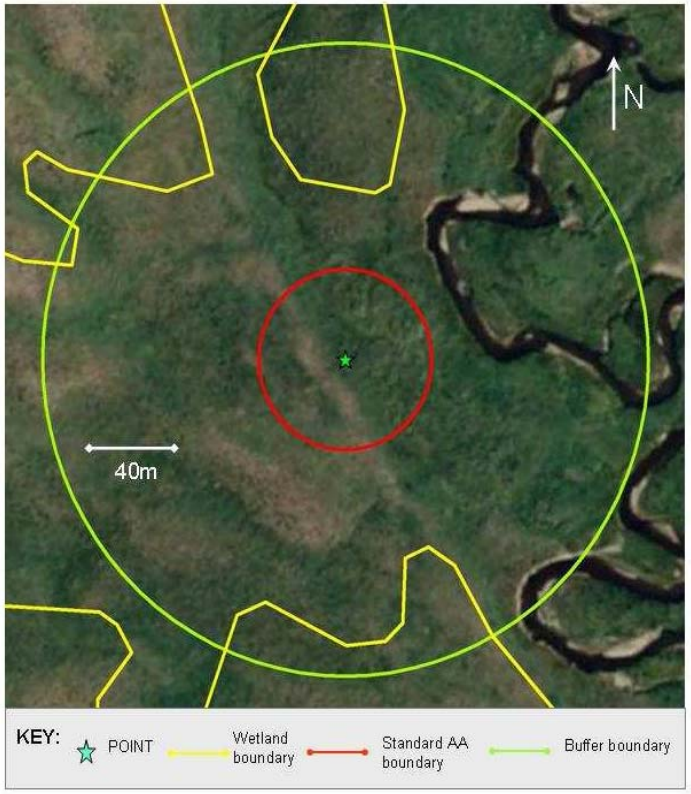


Figure 3.1. Example of Standard AA Layout depicted on the aerial photo from the site packet.

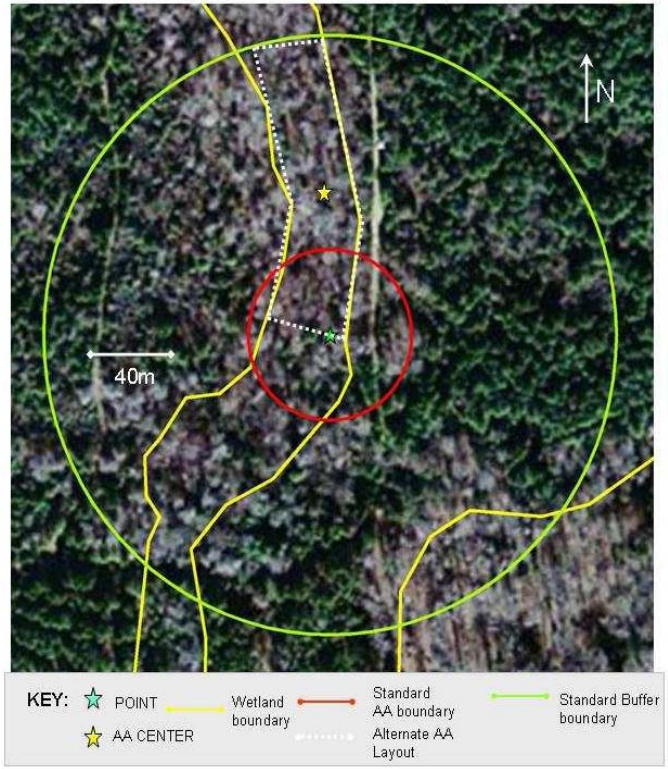


Figure 3.2. Example of Alternate Layout 2a depicted on the aerial photo of the site packet with the AA adjusted to account for the shape of the wetland (see Section 3.1.2.2.3).

Assessment Area Characterization

- **FORM AA-2: ASSESSMENT AREA CHARACTERIZATION**
- Site Name: _____ Date: __ __/__ __/2011
- Site ID #: NWCA11-___ ___ ___ ___ Team: _____
- **Wetland Type**
- **FWS Status and Trends Class – Check predominant type:**
- ___Estuarine Intertidal Emergent (E2EM)
- ___Estuarine Intertidal Scrub Shrub/Forested (E2SS)
- ___Palustrine Emergent (PEM)
- ___Palustrine Scrub Shrub (PSS)
- ___Palustrine Forested (PF)
- ___Palustrine Farmed (not currently in crop production) (Pf)
- ___Palustrine Unconsolidated Bottom/Aquatic Bed (PUBPAB)
- **Check predominant subclass:**
- ___Palustrine Aquatic Bed (PAB)
- ___Pond – Aquaculture (PUBa)
- ___Pond – Agriculture (PUBf)
- ___Pond – Natural (PUBn)
- ___Pond – Urban (PUBu)
- **Hydrogeomorphic Classes – Check type:**
- ___Depression Closed
- ___Depression Closed – Human Excavated
- ___Depression Closed – Human Impounded
- ___Depression Closed – Human Excavated and Impounded
- ___Depression Open
- ___Depression Open – Human Excavated
- ___Depression Open – Human Impounded
- ___Depression Open – Human Excavated and Impounded
- ___Flats Mineral Soil
- ___Fats Organic Soil
- ___Lacustrine Fringe
- ___Lacustrine Artificially Flooded
- ___Riverine Tidal
- ___Riverine Upper Perennial (1st or 2nd order stream)
- ___Riverine Lower Perennial (3rd order or higher stream)
- ___Slope Topographic
- ___Slope Stratographic
- ___Tidal Fringe
- **Other Wetland Classification Systems:** Complete to document the dominant wetland type
- using other wetland classification systems, e.g., a state classification system.
- System:_____ Wetland Class:_____
- System:_____ Wetland Class:_____

Assessment Area Stressors

- **FORM AA-3: AA HABITAT-VEGETATION STRESSORS**
- Site Name: _____ Date: __ __/__ __/2011
- Site ID #: NWCA11-___ ___ ___ ___ Team: _____
- Check all stressors present under each category and subcategory.
- **Fire – recently burned (blackened):**
- □ Tree canopy
- □ Ground cover
- □ Overall
- **Excessive Herbivory:**
- □ Insect Damage
- □ Tree canopy
- □ Shrub layer
- □ Browsing or grazing (wild or domestic animals)
- □ Shrub
- □ Grass and/or forb layer (generally < 3 inches high)
- **Human Use:**
- □ Dumping – garbage and other debris
- □ Farmed
- □ Crop production
- □ Grazing
- □ Landscaped
- □ Managed
- □ Chemical defoliation due to spraying
- □ Converted to tree plantation
- □ Forest harvesting, recent
- □ Clear-cut
- □ Selective cut
- □ Forest harvesting, not recent
- □ Clear-cut
- □ Selective cut
- □ Mowing; shrub cutting
- □ Other harvesting (e.g., removal of greenery as is done for the florist industry)
- □ Recreation
- □ Off-road vehicle damage
- □ Trampling/trails

Assessment Area Stressors

- **FORM AA-3: AA HABITAT-VEGETATION STRESSORS**
- Site Name: _____ Date: __ __/__ __/2011
- **Other:**
- □ Nutrient enrichment
- □ Direct application of fertilizer
- □ Input from runoff
- □ Indicator present _____
- □ Soil Compaction (animal or human)
- □ Soil Erosion (from wind, water, or overuse)
- □ _____
- □ _____
- **Targeted Alien Species – Circle P if present; A if absent**
- THESE SPECIES ARE JUST EXAMPLES; THE FINAL LIST IS IN DEVELOPMENT.
- P A Canada Thistle (scientific name)
- P A Cheat Grass (scientific name)
- P A Common Reed (scientific name)
- P A Garlic Mustard (scientific name)
- P A Giant Reed (scientific name)
- P A Himalayan Blackberry (scientific name)
- P A Japanese Knotweed (scientific name)
- P A Kudzu (scientific name)
- P A Leafy Spurge (scientific name)
- P A Poison Hemlock (scientific name)
- P A Purple Loosestrife (scientific name)
- P A Reed Canary Grass (scientific name)

Vegetation

Rationale:

- Has been used effectively in assessing overall ecological condition and to distinguish particular stressors (Tiner 1999, Garnier et al. 2004, Quétier et al. 2007)

- Data describing species composition and abundance and vegetation structure are powerful, robust, and relatively easy to gather. In addition, they can be used to derive a myriad of metrics or indicators that are useful descriptors of ecological integrity or stress (e.g., USEPA 2002, Bourdaghs et al. 2006, Magee et al. 2008, Mack and Kentula in review).

Measures:

- Examples of the types of data to be collected are:
- Species composition and abundance
- Native species
- Alien species
- Floristic quality
- Guild composition
- Community composition
- Vegetation structure

Potential Indicators

- Vegetation IBI (CO, OH, MN, NC, ND, others)
- Floristic Quality Assessment Index (FQAI)
- Vegetation O/E Model (Rocky Mountain National Park)

Vegetation Plot Layout

Reference Card V-1, Side A. Rules for Veg Plot Placement and Examples of Plot Layout Configurations

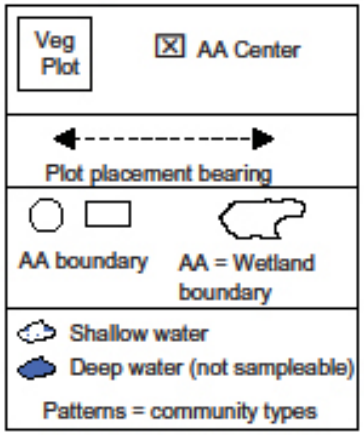
Rules for Veg Plot Placement within the Assessment Area (AA)

1a AA is ½ ha in area.....**2**
- **2a** AA is a circle .....*Standard Veg Plot Layout*
- **2b** AA is a rectangle (wetland dimension is < 80m in at least one direction).....**3**
  - **3a** AA has width and length > 30m .....*Alternate Veg Plot Layout 1*
  - **3b** AA is ≤ 30m wide .....*Alternate Veg Plot Layout 2*

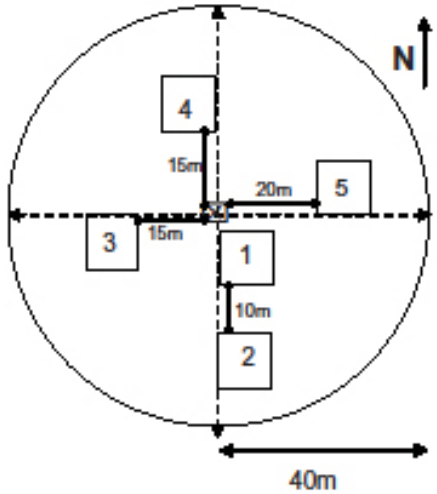
1b AA < ½ ha, but > 0.1ha; a polygon equaling wetland boundary.....*Alternate Veg Plot Layout 3*

1c Obstacles prevent placement of plots in designated locations in AA (deep water; wide, deep channels; cliffs, other physical barriers, etc.) .....*Obstacle Veg Plot Layout*

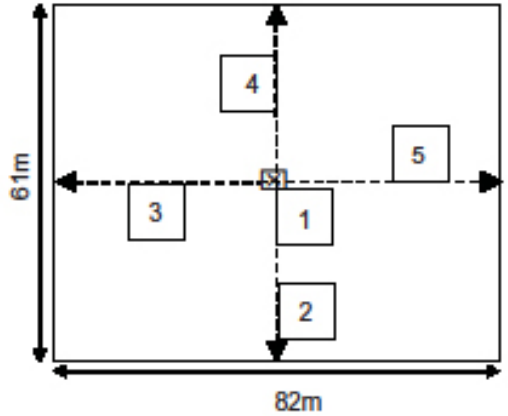
***Examples* (scales vary) of Veg Plot Layout Configurations – below and next page**

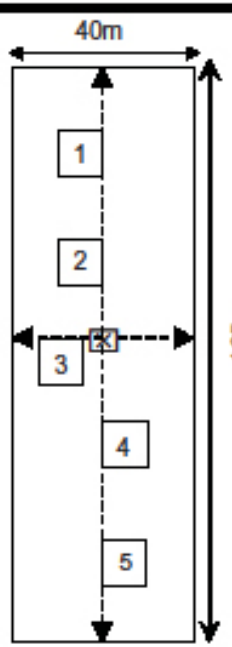


Standard Veg Plot Layout –
AA ½ hectare circle



Alternate Veg Plot Layout 1
AA ½ hectare rectangle,
width and length > 30m

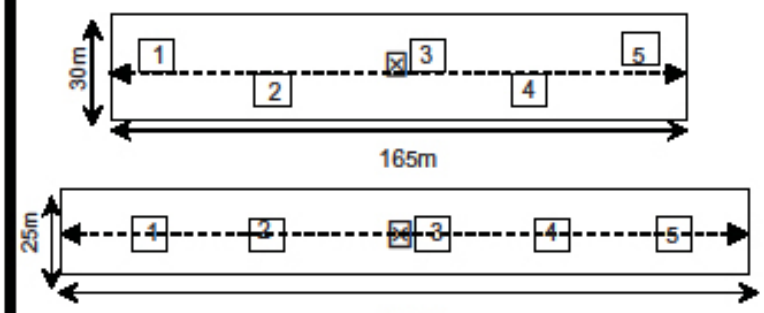




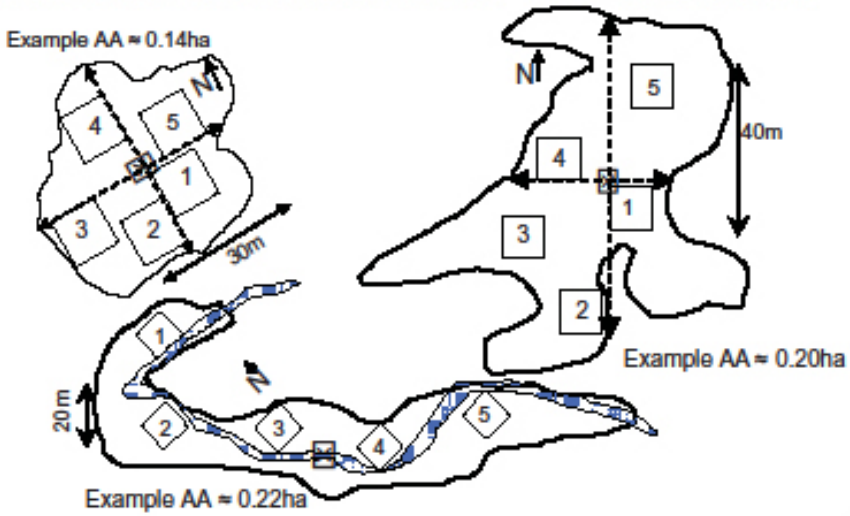
Alternate Vegetation Plot Layout

Reference Card V-1, Side B. Examples of Plot Layout Configurations *continued*

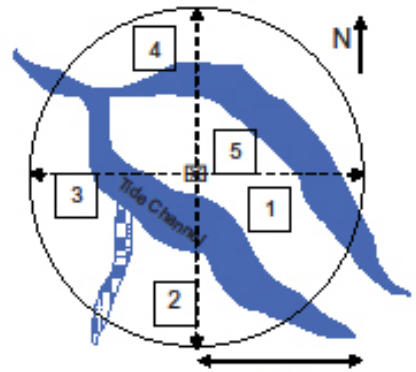
Alternate Veg Plot Layout 2 – AA is a ½ ha rectangle ≤ 30 wide



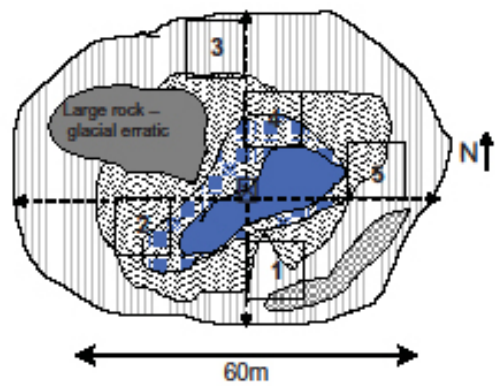
Alternate Veg Plot Layout 3 – AA (0.1ha to < 0.5ha) = wetland boundary



Obstacle Veg Plot Layout



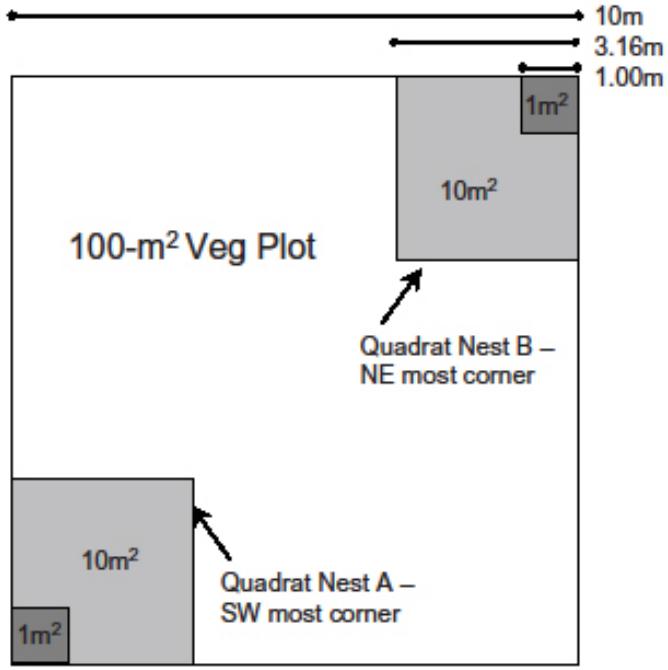
Example AA – 0.5ha



Example AA ≈ 0.4ha

Vegetation Data Collection

Reference Card V-2. Side B – Veg Plot Configuration and Data Collection Summary.



Establishing Quadrat Nests:

___ *Outside edges of quadrats*: Formed by the meter tape or marked cords defining boundary of the 100-m² Veg Plot

___*Inside edges of 10-m² quadrat*: two 3.16 m PVC poles with decimeter points marked in red (poles may break down to shorter lengths for easy of carrying)

___*Inside edges of 1-m² quadrat frame*: two 1m PVC poles with decimeter points marked in red, poles can be joined with an elbow joint in the field

Species Presence Data in 1-m² and 10-m² quadrats

1. Collect species presence data in nested quadrats (1-m² and 10-m² at SW (Nest A) and NE (Nest B) most Veg Plot corners) of 100-m² Veg Plot.
2. For each species present in the SW or NE Nest, record the smallest quadrat in which it occurs (1-m² or 10-m²) on **Form V-2**.

Data to Collect in 100-m² Veg Plot

1. *Individual vascular plant species* – Estimate cover for each species and record the primary stratum in which it occurs; **Form V-2**. For ***free species, only***: If a tree species occurs in multiple strata, estimate its cover for each stratum in which it occurs (e.g., ground layer, shrub layer, tree layer).
2. *Vertical strata* – Estimate total cover of each vertical stratum (canopy tree, tree, tall shrub, shrub, ground/herb, submerged aquatic vegetation, and floating aquatic vegetation layers); **Form V-3a**.
3. Estimate cover of *non-vascular groups* (bryophytes, ground lichens, and macroalgae); **Form V-3a**.
4. Collect data for *ground surface attributes*; **Form V-3b**
5. *Shrubs* – Estimate average height of clumps or patches for each species; **Form V-4**
6. *Trees* – Count stems for individuals > 5 cm diameter breast height (dbh) by diameter class (5-10, 10-25, 26-50, 51-75, 76-100, and > 100 cm) by species; **Form V-4**.
7. *Standing dead trees and snags* - Count total number of stems > 5 cm dbh by diameter class (5-10, 10-25, 26-50, 51-75, 76-100, and > 100 cm); **Form V-4**..

Plant Specimen Collection and Tracking

1. Collect unknown species
2. Randomly select and collect QA specimens
3. Complete specimen labels, press plants, and record plant specimen tracking information on **Form V-5.**

Collecting Vegetation Data in the AA

Select Veg Plot Layout configuration appropriate for the AA (**Reference Card V-1**).

Establish five 100-m^2 (10X10m) Veg Plots at the locations designated for the selected Veg Plot Layout (**Reference Cards V-1** and **V-2, Side A, Form V-1**).

Once all five Veg Plots are established, collect the following data for **each** Veg Plot.

1. Plant species presence in nested 1-m^2 and 10-m^2 quadrats in the SW and NE corners of the 100-m^2 Veg Plot (**Reference Cards V-2, Side B**, **Forms V-2a** and **V-2b**).

2. Percent cover estimates for individual vascular plant species across the entire100-m^2 Veg Plot and identification of the primary vertical stratum in which each species occurs (**Reference Cards V-2**, **Side B** and **V-3**, **Forms V-2a** and **V-2b**).

3. Percent cover estimates of Vertical Vegetation Strata across the 100-m^2 Veg Plot (**Form V-3**, Page 1).

4. Percent cover estimates for each of three non-vascular groups (bryophytes, ground lichens, and macroalgae) across the 100-m^2 Veg Plot (**Form V-3**, Page 1).

5. Data describing ground surface attributes across the 100-m^2 Veg Plot (**Form V-3**, Page 2).

6. Average shrub height by species across the 100-m^2 Veg Plot (**Form V-4**).

7. Counts of trees by species and size class and counts of standing dead trees and snags by size class across the 100-m^2 Veg Plot (**Form V-4**).

Algae

Rationale:

- Respond quickly to environmental disturbances, both natural and anthropomorphic, and are one of the first indicators of ecological change in the wetland (McCormick and Cairns 1994).
- Many indicator attributes or metrics which describe ecological condition can be derived from data describing taxonomic composition and abundance of algae.
- Field method can be standardized across all wetland types.

Protocol:

- Adapting protocols from Maine, MSU, & USGS.
  - Multi-Habitat (plants, soils, water) Composite Sample
  - Laboratory Analysis

Example Metrics:

- Species Composition and Abundance
- Productivity
- Indicator Species

Algae

ALGAE

NWCA11- __ __ __ __

_____ /_____ /2011

Sample Volume: _____mL

ALGAL TOXIN EPIPHYTES

NWCA11- __ __ __ __

_____ /_____ /2011

ALGAL TOXIN SEDIMENT

NWCA11- __ __ __ __

_____ /_____ /2011

CHLOROPHYLL-a

NWCA11- __ __ __ __

_____ /_____ /2011

Volume Filtered: _____mL

FORM AL-1: NWCA ALGAE

Reviewed by (Initials): _____

Site ID: NWCA11- _____ Date: ___ / ___ / 2 0 1 1 Team ID _____

SAMPLE ID:	Taxonomic ID Sample - No Surface Water in AA - Exposed Soil Samples			
Vegetation Epiphytes	Present?	# of Subsamples	Comments	No Sample Collected ○
	○			
Sediment	Present?	# of Subsamples	Comments	No Sample Collected ○
	○			
Total # of subsamples =		Volume of composite sample with water in 1 liter bottle (ml)		

Use comment section to explain: No measurement, suspect measurement or observation made.

SAMPLE ID:	Taxonomic ID Sample - Surface Water Present in AA (Nalgene 125ml)			
Vegetation Epiphytes	Present?	# of Subsamples	Comments	No Sample Collected ○
	○			
Sediment	Present?	# of Subsamples	Comments	No Sample Collected ○
	○			
Total # of subsamples =		Volume of composite sample with water in 1 liter bottle (ml)		

Use comment section to explain: No measurement, suspect measurement or observation made.

Biomass: Chlorophyll-a Sample				
Chlorophyll-a	Vol Filtered 500ml?	Less than 500ml? Enter vol here:	Comments	No Sample Collected ○
	○ Yes ○ No	ml		

Use comment section to explain: No measurement, suspect measurement or observation made.

Algae Toxin Samples				
Sediment	Collected?	Composite Volume (ml)	Comments	No Sample Collected ○
	○			
Vegetation Epiphytes	Collected?	Composite Volume (ml)	Comments	No Sample Collected ○
	○			

Use comment section to explain: No measurement, suspect measurement or observation made.

05/06/2010 NWCA Algae 6285024681

DRAFT - NOT FOR USE IN FIELD

Soils

Rationale:

- The presence of hydric soils is a key attribute that defines wetlands
- Soils influence surface and ground water movement in wetlands
- Soils also provide a matrix for biogeochemical processes (e.g. nutrient cycling, pollutant storage) which affect wetland vegetation and other wetland ecosystem components that reflect ecological condition (Tiner 1991, Mitsch and Gosselink 2007).

Protocol:

- USDA NRCS has major role in development of field and lab protocol.
  - Soil Profile (60cm)
  - Soil Profile (125 cm)
  - Soil chemistry analyses from 125 cm pit
  - Soil disturbance

Soil Chemistry Analyses (partial list):

- Total C, N, S
- Phosphorous (Olsen, Mechlich #3)
- Bulk Density
- pH, Electrical Conductivity, Cation Exchange Capacity
- Trace Elements (including Hg, Se, As)

Soil Pit Locations

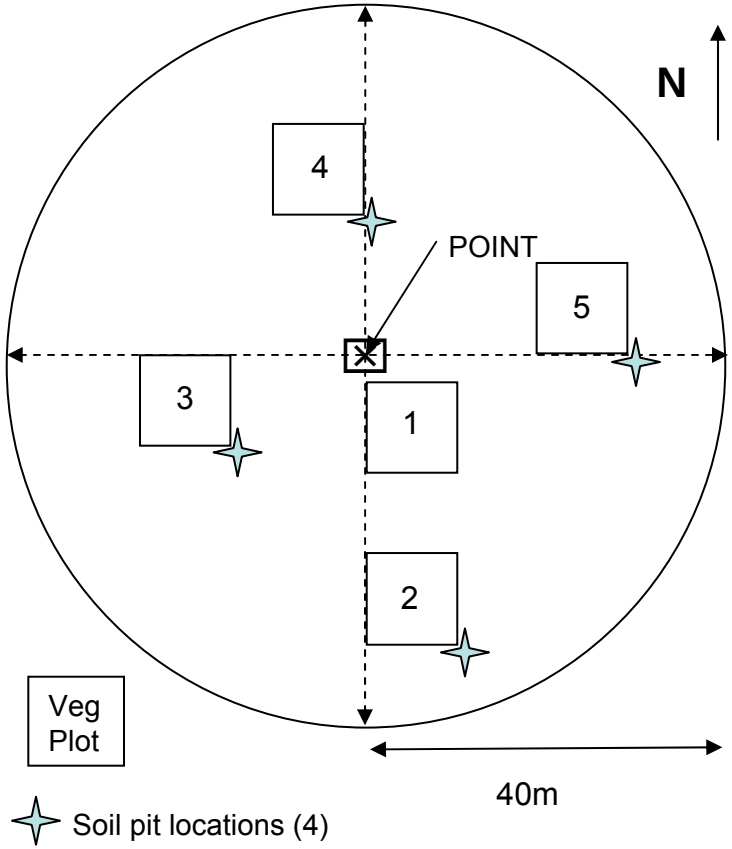
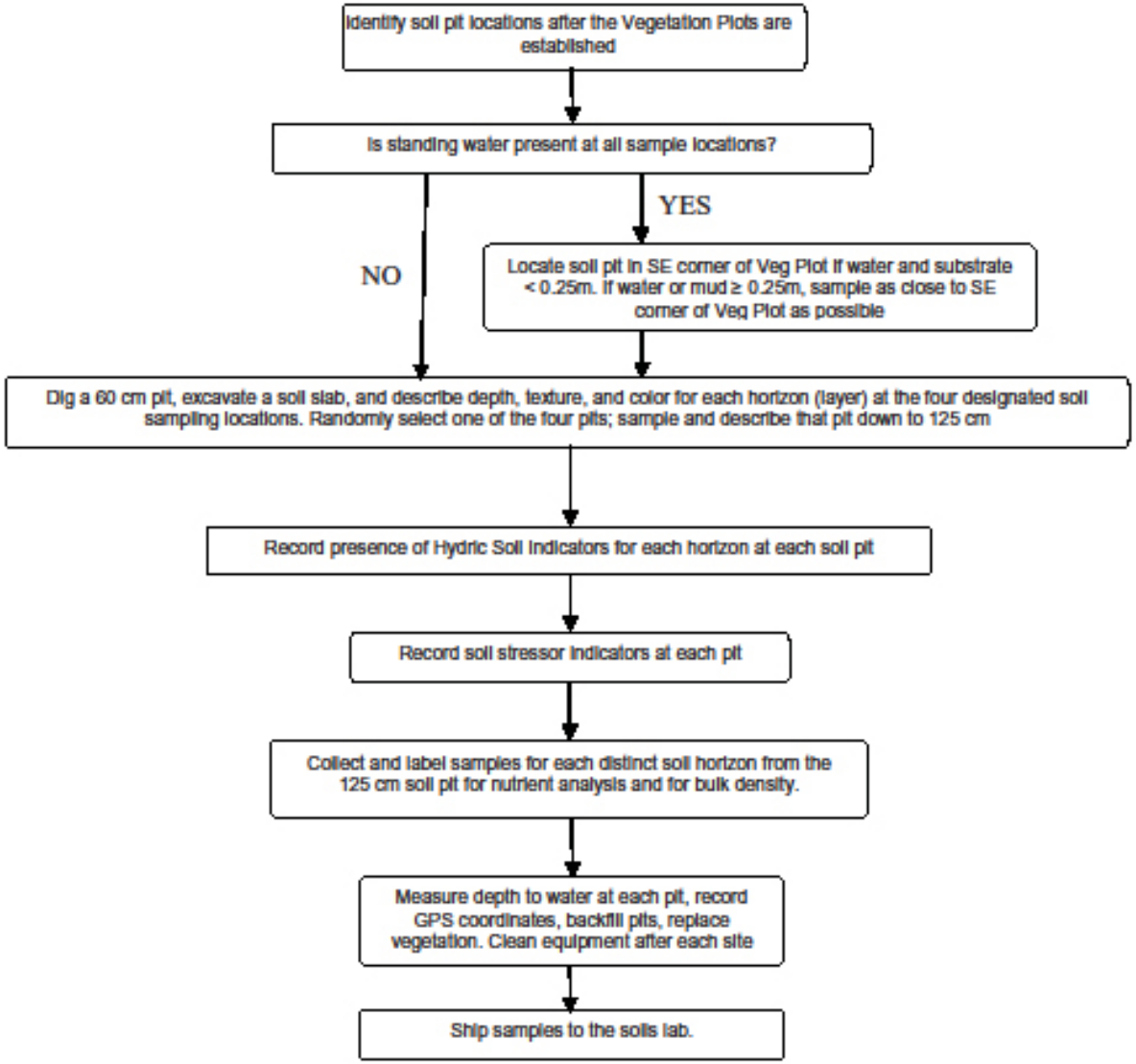


Figure 6-2. Standard ½ hectare circle assessment area layout with 5 Veg plots and 4 soil pits.


Identify soil pit locations after the Vegetation Plots are established
Is standing water present at all sample locations?
YES
NO
Locate soil pit in SE corner of Veg Plot if water and substrate < 0.25m. If water or mud ≥ 0.25m, sample as close to SE corner of Veg Plot as possible
Dig a 60 cm pit, excavate a soil slab, and describe depth, texture, and color for each horizon (layer) at the four designated soil sampling locations. Randomly select one of the four pits; sample and describe that pit down to 125 cm
Record presence of Hydric Soil Indicators for each horizon at each soil pit
Record soil stressor indicators at each pit
Collect and label samples for each distinct soil horizon from the 125 cm soil pit for nutrient analysis and for bulk density.
Measure depth to water at each pit, record GPS coordinates, backfill pits, replace vegetation. Clean equipment after each site
Ship samples to the soils lab.

Soil Sampling

- **Soil profile data form:**
- Identify horizon; record dept; texture; % rock fragments > 2 mm; % roots, boundary abruptness; % pores; matrix color; and redoximorphic features.
- **Hydric Soil Indicators and water status form:**
- Check applicable Hydric Soil Indicators (generally related to the entire profile but note when they are applied to specific horizon(s)).
- Water infiltration after digging the soil pits:
- Measure from the surface down and record the value as a negative number.
- Check all pits before back-filling pits to measure any water that has accumulated.
- Check if no standing water is present. If there is obvious water exudate on the pit walls or wetted versus dry zones, measure the depth that it begins and record it as the saturation level.
- **Soil Stressors form:**
- Check applicable soil stressors within a 5 m radius of the soil pit or check ‘no stressors present’.
- **Soil sample form:**
- Record site ID, soil horizon, layer attributes, sample status, and collection date
- on the plastic sample bag with an indelible felt-tipped pen and add a waterproof paper or plastic label with the same information inside the bag.
- For chemical and nutrient analysis – Collect ~ quart of soil from each distinct horizon.
- For bulk density collect 3 hammered cores or peat cores of soil from each horizon, measured for volume and composited in one bag.
- For isotope analysis collect 3 pvc tubes from the top 10cm after removing loose litter.
- Place all 3 in single plastic bag and label the bag with site, date, and “Isotopes”

Hydrology & Water Chemistry

Rationale:

- Wetland **hydrology** is a key driver of wetland ecosystem formation and persistence.
- Hydrology influences wetland soil condition as well as biotic community composition and structure.
- In turn, hydrology is controlled by watershed characteristics, and geomorphic conditions found at each site (Tiner 1999, Mitsch and Gosselink 2007).
- Hydrologic dynamics influence biological community composition, impact biogeochemical processes, and indicate recent or historical disturbances.

Protocol:

- It is difficult to quantitatively assess wetland hydrology with a single field visit.
- We are developing the field and lab protocol based on feedback from states and tribes.
  - Water table at the time of sampling
  - Indirect indicators of inundation and saturation
  - Pore and surface water chemistry

Example Metrics:

- Degree of saturation
- Degree of inundation
- Types of hydrologic alteration

Hydrology & Water Chemistry

Rationale:

- Along with vegetation and soil, **water** is one of the key determinants of wetland systems.
- Some studies show that water chemistry analyses are useful for evaluating wetland ecological integrity and for evaluating stressor-response relationships (Lane and Brown, 2007; Reiss and Brown, 2005).

Example Metrics:

- pH
- Nutrient Enrichment
- Dissolved oxygen
- Temperature

Hydrology

FORM HY-1: NWCA HYDROLOGY ASSESSMENT

Reviewed by (initials): _____

Site ID: NWCA11- Date: ___ ___ 2 0 1 1 Team ID _____

Tidal Stage: ○ Incoming ○ Outgoing ○ Slack

Identify and enumerate water input & outflow for water sources and hydrologic alterations.

Water Sources/Flux		QTY	Rank (1=strongest) top 3 sources by perceived influence: Top 3
Inputs	Inlet Streams		○1 ○2 ○3
	Springs		○1 ○2 ○3
	Tidal Channel		○1 ○2 ○3
	Ocean		○1 ○2 ○3
	Ditches		○1 ○2 ○3
	Culverts		○1 ○2 ○3
	Pipes		○1 ○2 ○3
	Precipitation		○1 ○2 ○3
	Groundwater		○1 ○2 ○3
	Overbank Flooding		○1 ○2 ○3
	Surface Flow		○1 ○2 ○3
	Snow Melt		○1 ○2 ○3
Outflow	Outlets		○1 ○2 ○3

AA Hydrology Stressors		QTY	Rank (1=strongest) top 3 sources by perceived influence: Top 3
Damming Features (dikes/berms, dams, roads, RR bed, fill)			○1 ○2 ○3
Ditches			○1 ○2 ○3
Deepest Ditch Depth (cm)	Depth 1		○1 ○2 ○3
	Depth 2		○1 ○2 ○3
	Depth 3		○1 ○2 ○3
Drains			○1 ○2 ○3
Shallow Channels			○1 ○2 ○3
Cattle Tramping			○1 ○2 ○3
RV Tracks			○1 ○2 ○3
Water Pumps			○1 ○2 ○3
Field Tiling		○	○1 ○2 ○3
Excavation/Dredging		○	○1 ○2 ○3
Other e.g. Impervious surface - roads		○	○1 ○2 ○3

ID outflow type: ○ Stream ○ Ditch ○ Culvert ○ Pipe ○ Other: _____ If other, explain _____

Drift Lines:
- ○ Water Stains
- ○ Leaf Packs (caught in vegetation)
- ○ Plant Detritus/Tidal Wrack
- ○ Anthropogenic Trash (part of wrack or detritus)

Fresh Sediment Influx (0-100%)

(% of AA recently covered by sediment): _____

AA Surface Water (areal extent) (0-100%)

Day of Sampling: _____

Seasonal High: _____

Soil Pit Water Depth (surface to top of groundwater)

	Depth (cm)	Not enough time to fill	No water present
Pit 1		○	○
Pit 2		○	○
Pit 3		○	○
Pit 4		○	○

Comments:

Weather desciption on day of sampling:

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Water Quality

FORM WQ-1: NWCA WATER QUALITY

Reviewed by (initials): _____

Site ID: NWCA11- _____ Date: ___/___/2011 Team ID _____

SURFACE WATER (CUBITAINER) No Sample Collected ○

Sample ID	Chilled	Time Collected (hhmm)	Comments
	○	:	

Max Depth of SW in AA:		
Depth of SW in AA > than 100cm?	○ Yes ○ No	
If No, Depth of SW in AA (0-100 cm)	_____ cm	
SW Field Probe Readings:		
DO(mg/L) XX.X	___.___	
pH XX.XX	___.___	
Conductivity (µS/cm)	_____.___	
Temp. (°C) XX.X	___.___	
Field Calibration:		
Calibration Performed?	○ Yes ○ No	

CHARACTERISTICS OF AA SURFACE WATER

SUBSTRATE COLOR: ○ Black ○ Brown ○ Light Brown ○ Dark Brown ○ Gray ○ Other _____

SUBSTRATE: ○ Sand ○ Muck ○ Gravel ○ Cobble ○ Shellhash ○ Other _____

WATER SMELL: ○ Fishy ○ Chemical ○ Sulphur ○ None ○ Other _____

SURFACE: ○ Film ○ Floc ○ Nothing Noted ○ Other _____

Evidence of disturbance: _____

Flag	Comments

05/06/2010 NWCA Water Quality

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Next Steps

- States have received points
- FOM has been revised
- Draft Final FOM subjected to final Peer Review-Technical Workshop May 2010
- Finalize QAPP
- Training early spring 2011
- Field work in 2011

Remaining Planning Activities: 2010

Indicators	Survey Design	Reference Condition	Survey Administration
Refine FOM based on testing comments (By 4/1/2010) NWQMC Field Demonstration Workshop (April 2010) EPA ORD Technical Review Workshop (Spring 2010) Final FOM (Fall 2010)	**Distribute Sample Locations** (January 2010) Finalize site reconnaissance procedures (March 2010) Distribute site maps (April 2010) Initiate Site Reconnaissance Process (Spring 2010)	**Draft Data Analysis Plan** (Winter 2010) Develop approach to defining reference condition (Summer 2010) Identify targeted reference sites (May 2010) Facilitate State and Tribal Workgroup (2010)	**Communicate with States and Tribes** (Always) Coordinate with Regions on State and Tribal 106 work plans (Spring 2010) One-on-One meetings as needed (Spring – Summer 2010)

Using the NWCA Results

- Establish the **national baseline** of wetland condition.
- Coordinate with the U.S. FWS Wetland (acreage) Status and Trends program.
- Enhance State and Tribal wetland monitoring programs
- Identify wetland types and geographies that are especially degraded
- Identify the stressors most commonly associated with degraded wetland conditions.
- Inform development of ecologically-meaningful performance standards to direct restoration and improvement activities.
- Explore ways to quantify the ecosystem services that are derived from wetlands and their restoration.

NWCA Benefits for State Programs

- Through active participation in the NWCA, States will have:
  - An experienced sampling team
  - Sampling Equipment
  - Level 3 Field Sampling and Lab Methods
  - A broad-scale multi-metric index (MMI)
  - A calibrated Rapid Assessment Method (RAM)
  - Reference data for some wetland types

Key Contact Information

- Contacts: Overall Coordination and Logistics
  - Michael Scozzafava: Scozzafava.michaele@epa.gov, 202-566-1376
  - Gregg Serenbetz: Serenbetz.gregg@epa.gov, 202-566-1253

- Contacts:Technical Questions
  - Mary Kentula: Kentula.mary@epa.gov, 541-754-4478
  - Teresa Magee: magee.teresa@epa.gov, 541-754-
  - Michael Scozzafava: Scozzafava.michaele@epa.gov, 202-566-1376
  - Chris Faulkner: faulkner.chris@epa.gov, 202-566-1185