Wetland Mapping Consortium: National SURRGO Wetland Soils Project

Wetland Mapping Consortium Webinar

February 26, 2013

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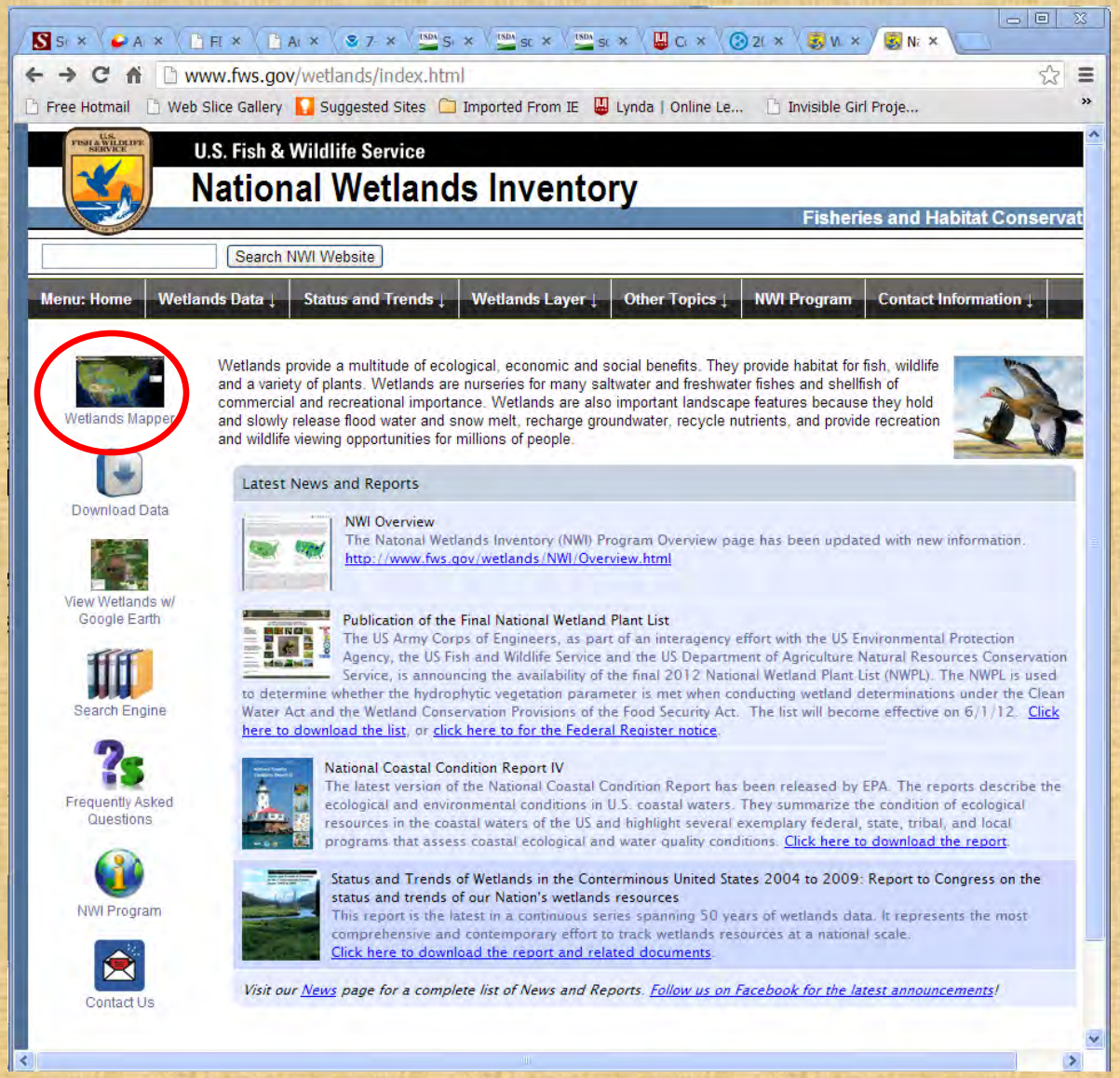
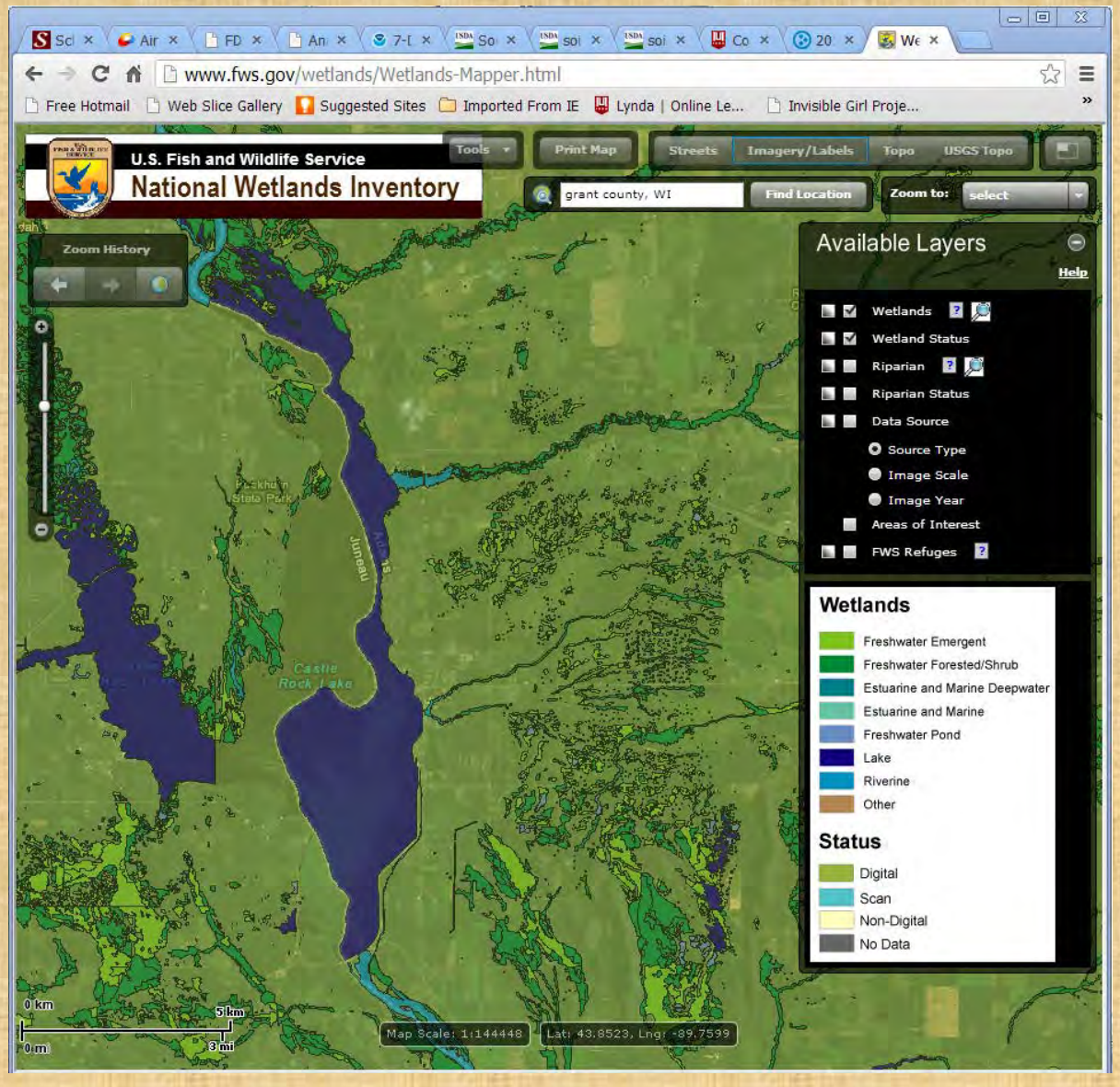
Wetland Restoration

- Problem 1: Regulatory agencies, and people who are regulated to restore or replace wetlands do not have a simple database to find suitable sites.
- Problem 2: Agency planners must compile the soils information from an area by hand before they can conduct regional planning.
- Problem 3: Restoration can be an expensive, unsuccessful effort.

http://www.weogeo.com/blog/Top10_Datasets_on_WeoGeo.html - 3rd most useful data set



Wetlands Mapper



Potential Wetland Soil Landscapes Data - Goal

- The goal of the project is to produce a soil/hydrology/site data set that can be used as a base data set to find landscapes that have or once supported wetlands. Those landscapes should have dominantly hydric soils.
- The purpose is to inform the wetland community, planners, developers, and private citizens of the location of sites that have the potential to be easily, inexpensively, and reliably converted into wetlands for mitigation and restoration purpose.

Potential Wetland Soil Landscapes Data Set - Background

- The PWSL data set uses SSURGO soil survey data for identifying soil map units that have a "hydric" soil as dominant component.
- Areas with dominantly hydric soils that are not mapped as wetlands, but are in cropland or pasture, adjacent to mapped wetlands, or have some indication of hydrologic presence or alteration are worthy sites for a field visit.
- Areas identified with dominantly hydric soils that have some remotely- sensed indicator of hydrologic presence or alteration are worth a field visit as well.

Potential Wetland Soil Landscapes Data Set - Premise

- Hydric soils do not occur outside of wetlands unless:
  - The vegetation or hydrology has been altered
  - There was a mistake in soil or NWI mapping

- Wetlands or potential wetland sites may occur outside of NWI wetland boundaries because:
  - The vegetation or hydrology had been altered
  - There was a mistake in soil or NWI mapping

Restoration of Vegetation or Hydrology

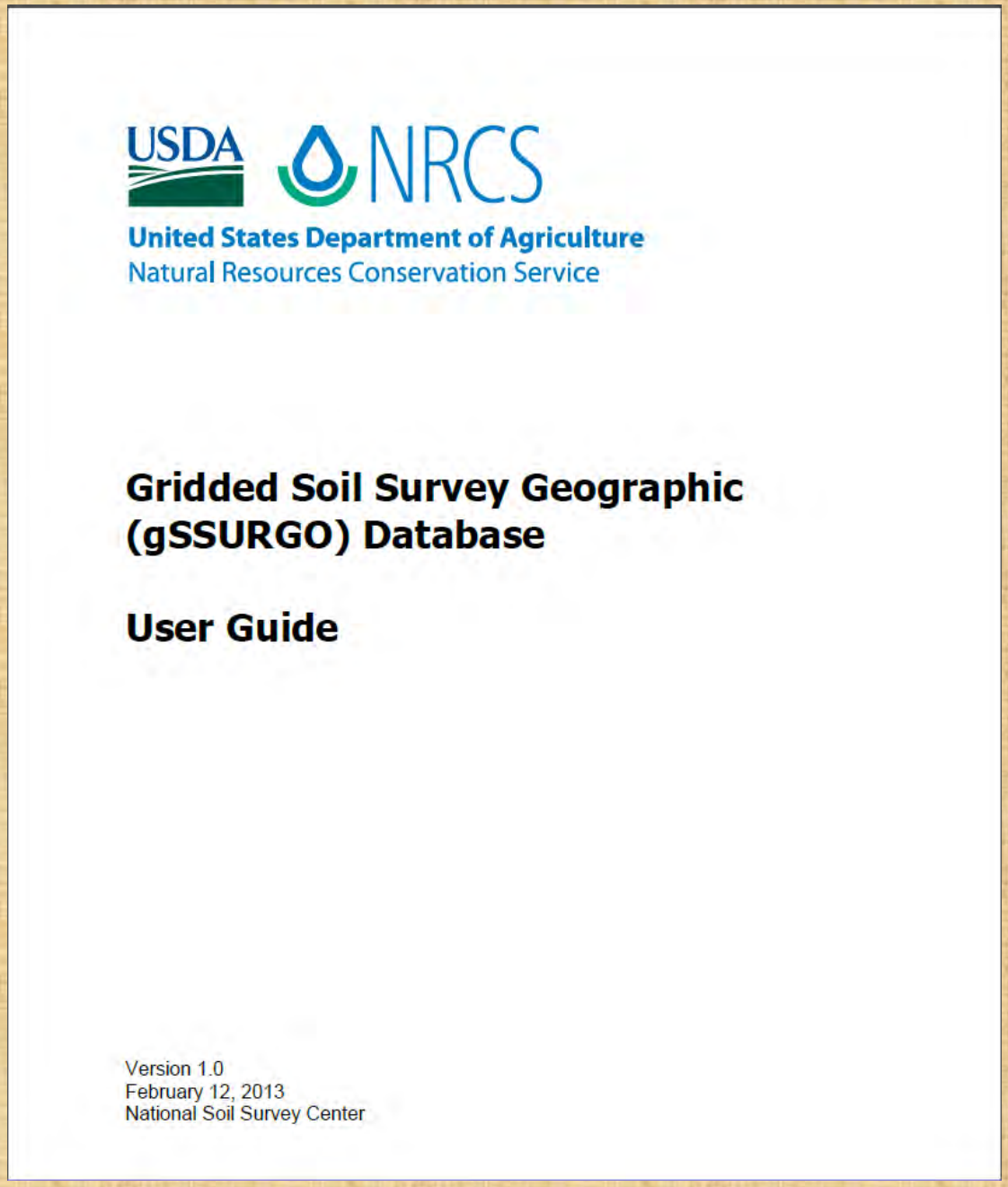
- Solution 1: Areas that were once wetlands and have had the vegetation altered may be simply restored; in fact, the seed bank may still be present or nurse plants may surround the site.
- Solution 2: Areas that were once wetlands and have had the hydrology altered may be simply restored by plugging drainage ditches.

gSSURGO - Background

- In 2012, USDA-NRCS produced a seamless gridded (10-m raster) version of their most detailed vector soil survey maps. The data set is currently out for testing.
- The data is joined across survey areas, edge-matched, converted to raster cells, and clipped by state boundary.
- The gSSURGO product will be available after testing at the NRCS Geodata Data Gateway.

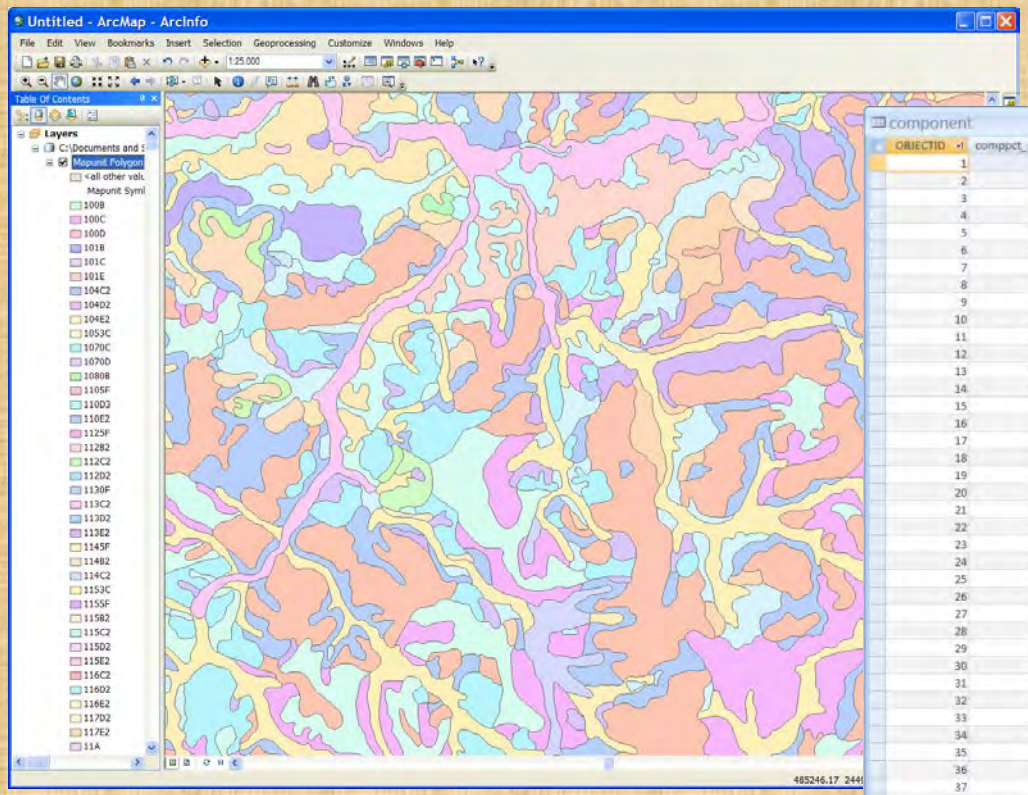
gSSURGO User's Guide

This will be offered to the public bundled with data when downloaded as well as on the new gSSURGO web page.



gSSURGO – Gridded SSURGO Data

- The PWSL data set includes the gridded (raster) SSURGO spatial layer plus eight relevant tables, rather than the entire set of over 50 SSURGO tables.



component

OBJECTID	comppct_r	compname	majcompflag	otherph	hydricrating	drainagecl	geomdesc	mukey	cokey
1	5	Adolph	No		Yes		depressions	421191	421191:575391
2	95	Magnor	Yes		No	Somewhat poorly drain	moraines	421192	421192:575392
3	5	Adolph	No		Yes		depressions	421192	421192:575393
4	100	Markey	Yes	UNDRAINED, HIGH PPT	Yes	Very poorly drained	depressions on outwa	421193	421193:575394
5	100	Menahga	Yes	HIGH PPT	No	Excessively drained	outwash plains, strea	421194	421194:575395
6	100	Menahga	Yes	HIGH PPT	No	Excessively drained	outwash plains, strea	421195	421195:575396
7	100	Menahga	Yes	HIGH PPT	No	Excessively drained	outwash plains, strea	421196	421196:575397
8	95	Mora	Yes	HIGH PPT	No	Moderately well draine	moraines	421197	421197:575398
9	5	Adolph	No		Yes		depressions	421197	421197:575399
10	100	Newson	Yes	UNDRAINED, HIGH PPT	Yes	Very poorly drained	depressions on outwa	421198	421198:575400
11	100	Nymore	Yes	HIGH PPT	No	Excessively drained	outwash plains, strea	421199	421199:575401
12	100	Omega	Yes	HIGH PPT	No	Somewhat excessively	outwash plains, strea	421200	421200:575402
13	100	Omega	Yes	HIGH PPT	No	Somewhat excessively	outwash plains, strea	421201	421201:575403
14	100	Omega	Yes	HIGH PPT	No	Somewhat excessively	outwash plains, strea	421202	421202:575404
15	99	Pits	Yes		Unranked		gravel pits	421203	421203:575405
16	1	Aquents	No		Yes	Poorly drained	depressions	421203	421203:575406
17	98	Plover	Yes		No	Somewhat poorly drain	lake plains	421204	421204:575407
18	2	Barronett	No		Yes		depressions	421204	421204:575408
19	98	Poskin	Yes		No	Somewhat poorly drain	depressions on outwa	421205	421205:575409
20	2	Warman variant	No		Yes		depressions	421205	421205:575410
21	100	Rifle	Yes	UNDRAINED	Yes	Very poorly drained	depressions on mora	421206	421206:575411
22	100	Rosholt	Yes	HIGH PPT	No	Well drained	outwash plains, strea	421207	421207:575412
23	100	Rosholt	Yes	HIGH PPT	No	Well drained	outwash plains, strea	421208	421208:575413
24	100	Rosholt	Yes	ERODED,HIGH PPT	No	Well drained	outwash plains, strea	421209	421209:575414
25	100	Rosholt	Yes	NORTH,HIGH PPT	No	Well drained	pitted outwash plains	421210	421210:575415
26	55	Rosholt	Yes	HIGH PPT	No	Well drained	pitted outwash plains	421211	421211:575416
27	45	Cromwell	Yes		No	Somewhat excessively	pitted outwash plains	421211	421211:575417
28	55	Rosholt	Yes	HIGH PPT	No	Well drained	pitted outwash plains	421212	421212:575418
29	45	Cromwell	Yes		No	Somewhat excessively	pitted outwash plains	421212	421212:575419
30	55	Rosholt	Yes	NORTH,HIGH PPT	No	Well drained	pitted outwash plains	421213	421213:575420
31	45	Cromwell	Yes		No	Somewhat excessively	pitted outwash plains	421213	421213:575421
32	55	Rosholt	Yes	NORTH,HIGH PPT	No	Well drained	pitted outwash plains	421214	421214:575422
33	45	Cromwell	Yes		No	Somewhat excessively	pitted outwash plains	421214	421214:575423
34	100	Rosholt variant	Yes		No	Well drained	hills	421215	421215:575424
35	95	Santiago	Yes	HIGH PPT	No	Well drained	moraines	421216	421216:575425
36	5	Adolph	No		Yes		depressions	421216	421216:575426
37	95	Santiago	Yes	HIGH PPT	No	Well drained	moraines	421217	421217:575427
38	5	Adolph	No		Yes		depressions	421217	421217:575428
39	95	Santiago	Yes	NORTH,HIGH PPT	No	Well drained	moraines	421218	421218:575429

Potential Wetland Soil Landscapes Data Set

- The PWSL gSSURGO data is meant to be used as a base layer, in combination with other data sets.
- Not all tables are included because that requires a high level of user expertise, increases the size of the geodatabase, and many of the tables are not involved in wetland projects.
- There are exceptions, and the entire data set can be obtained if needed at the NRCS Geodata Data Gateway.

Tables in the PWSL Data

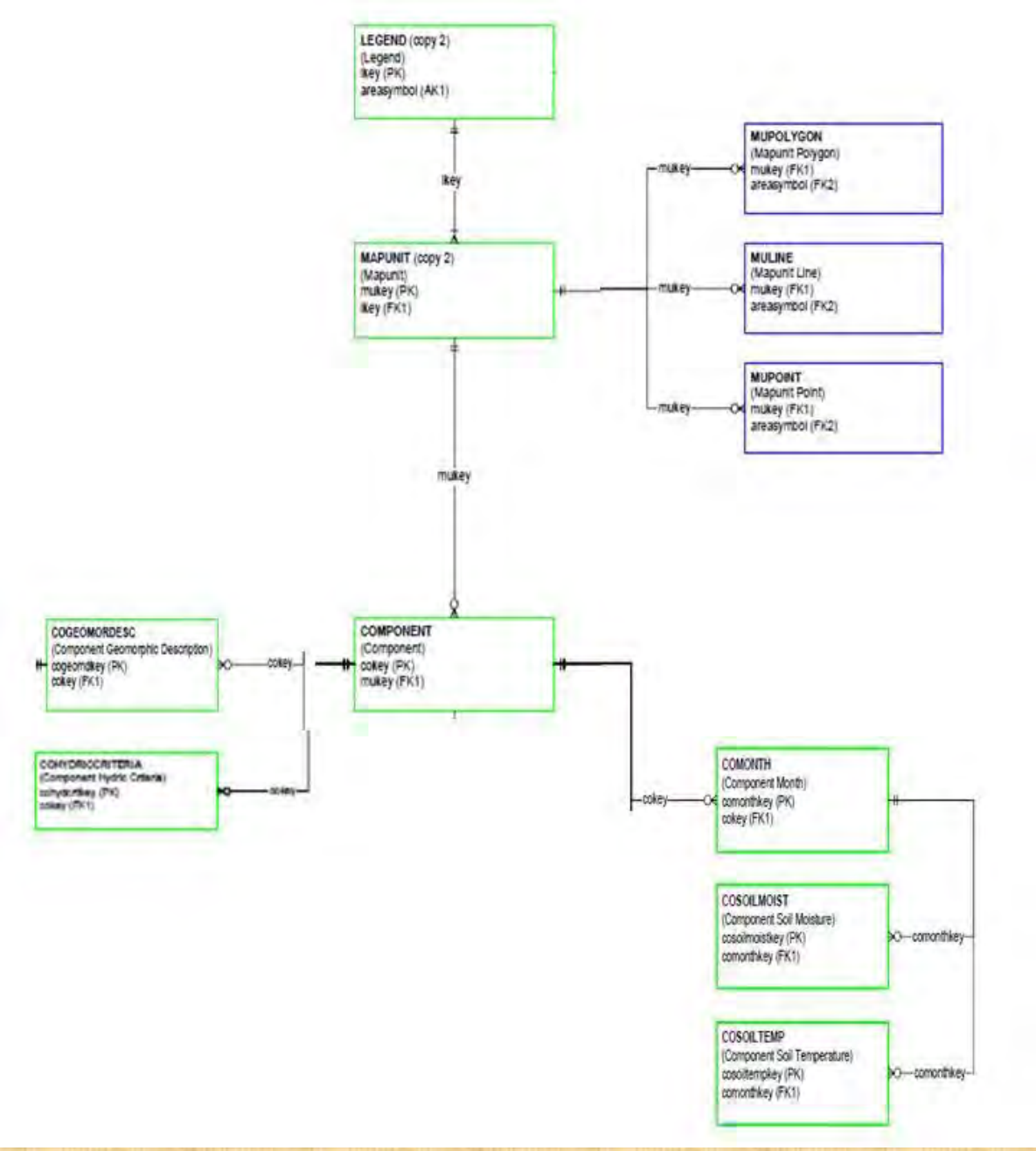
- Data tables include:
  - *Legend table* – (relationship between mapunits and spatial data)
  - *Mapunit table* – (mapunit symbol, mapunit name)
  - *Component table* – (component name and pct. composition, phase, hydric rating (yes/no), drainage class, hydrologic soil group, geomorphic setting)

Tables in the PWSL Data

- *Cohydriccriteria table* – (hydric criterion)
- *Comonth table* – (flood and ponding freq. and duration)
- *Cosoilmoist table* – (soil moisture depth and status)
- *Cosoiltemp table* – (soil temperature depth and status)
- *Cogeomordesc* – *(*geomorphic features)

gSSURGO Table Relationships

- Link these tables in a database manager such as Microsoft Access® using the indicated linking fields, without the need for a template.
- These are all 1:1 joins.
- Link to the spatial data afterwards.



gSSURGO Table Relationships and Linking Keys

- Legend Table - links to Mapunit table with lkey
- Mapunit Table – links to spatial data (vector) with mukey and areasymbol
- Component Table – links to Mapunit Table with mukey
- Cogeomordesc Table – links to Component Table with cokey
- Cohydriccriteria Table – links to Component Table with cokey
- Comonth - links to Component Table with cokey
- Cosoilmoist - links to Comonth Table with comonthkey
- Cosoiltemp - links to Comonth Table with comonthkey

SSURGO Component Table

component

OBJECTID	comppct_r	compname	majcompfla	otherph	hydricrating	drainagecl	geomdesc	mukey	cokey
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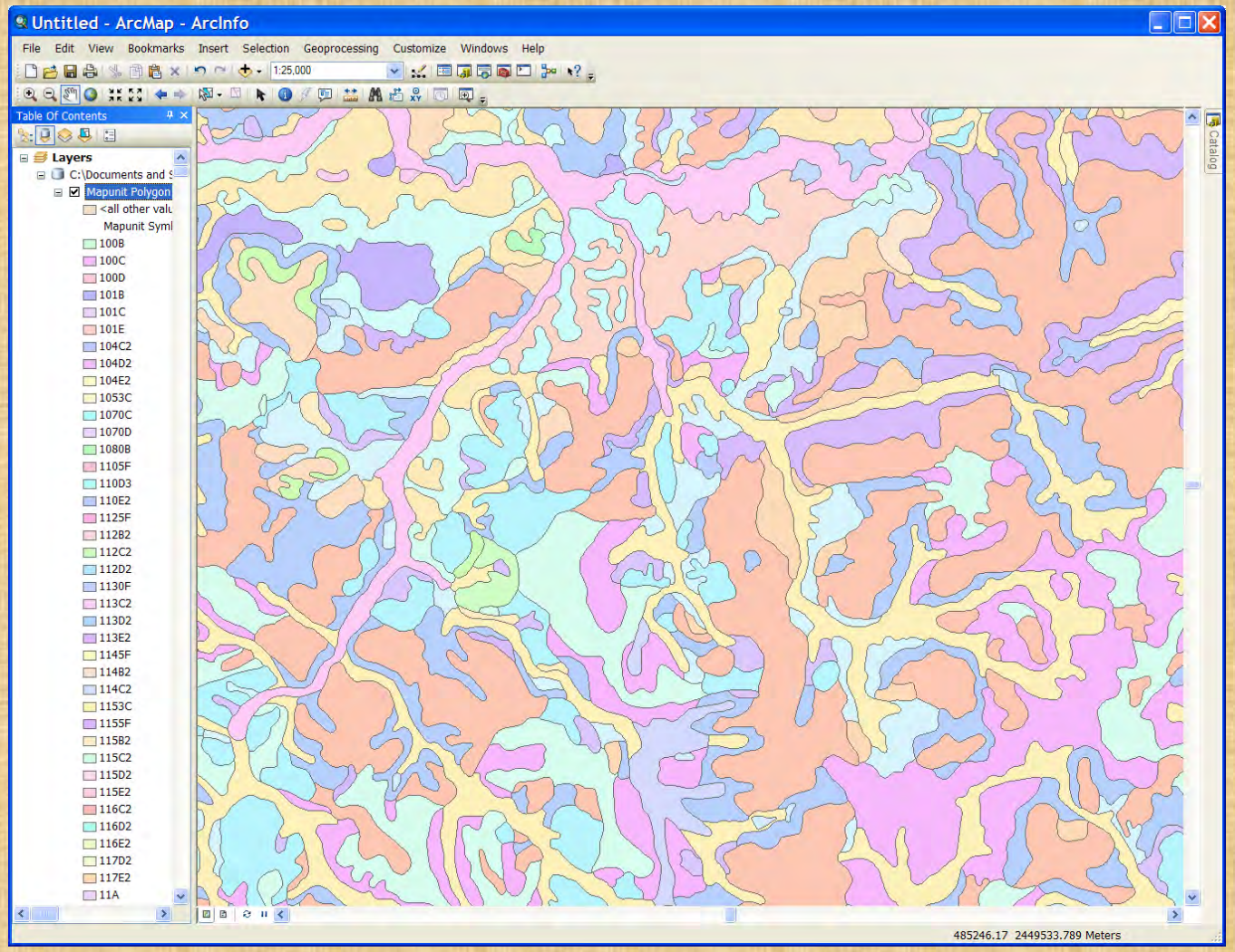
39	95	Santiago	Yes	NORTH,HIGH PPT	No	Well drained	moraines	421218	421218:575429

Record: 1 of 19871 No Filter Search

gSSURGO Soil Map



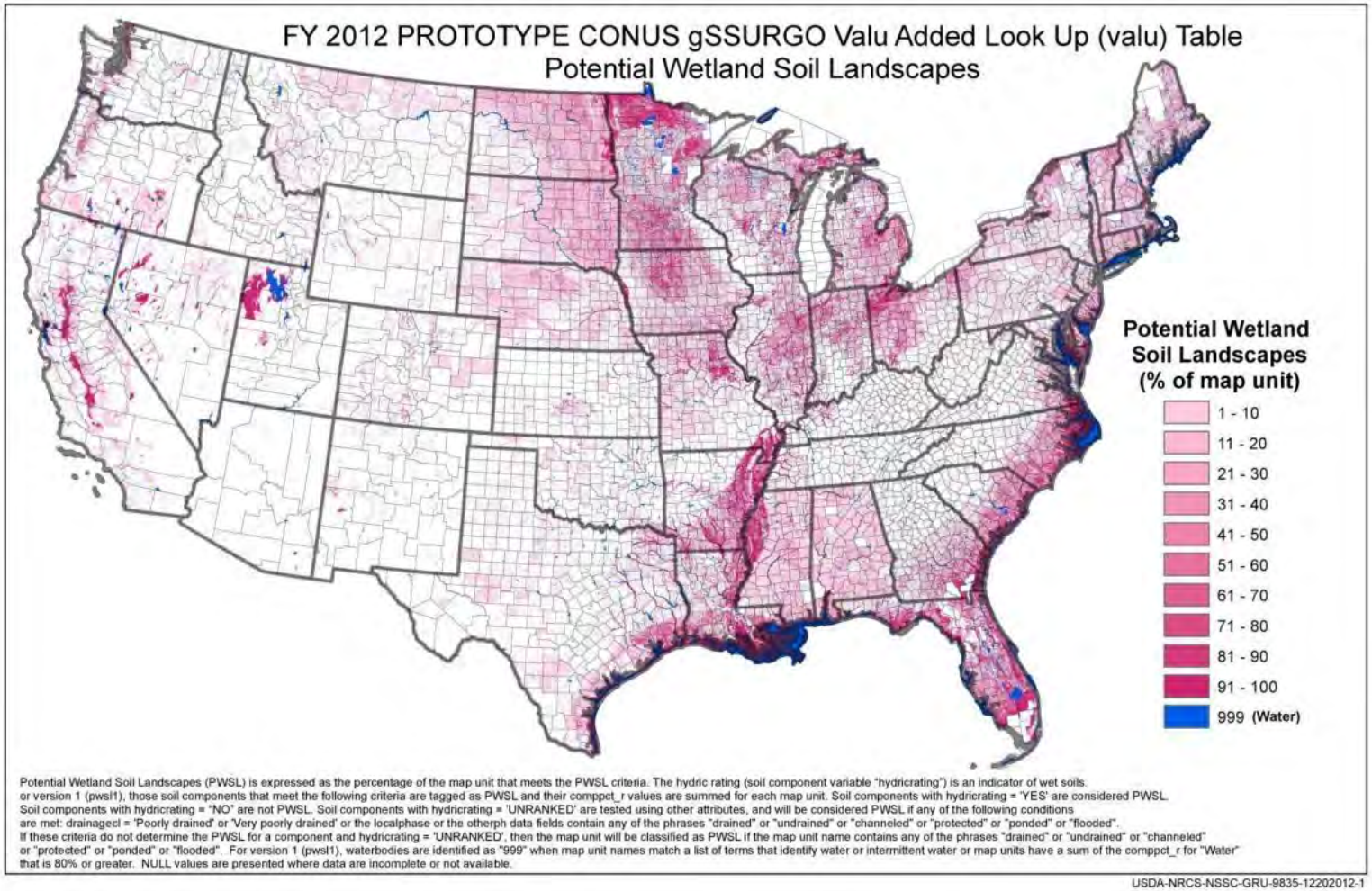
VALU Table

- In order to sum the percent composition of hydric soils in any map unit, a query was developed by Sharon Waltman of USDA-NRCS. The results are stored in a table that should be available at the same site where the PWSL data resides.

- There is a column ~called pwslpomu in the VALU table database table used to map the potential wetlands soil landscapes.

- The VALU table database is national, so you can use it with any or all States. Need to join the field to the 10m raster gSSURGO using Mukey.
  http://sdmdataaccess.nrcs.usda.gov/QueryHelp.aspx

Prototype Valu Table for sum PWSL %



The Query to Produce a State Valu Table

Find the soil map unit pixels that have the dominant soil with hydricrating = y. To do this, use the following query from the full data set.

- select areasymbol, musym, compname, mapunit.mukey, comppct_r, from legend
- join mapunit on legend.lkey=mapunit.lkey
- join component on component.mukey = mapunit.mukey
- join cohydriccriteria on component.mukey = mapunit.mukey
  where areasymbol like '__%' and [insert two letter state abbreviation]
  areasymbol <> 'US' and
  hydricrating = 'y' and
  majcompflag = 'yes' and
  component.cokey in
- (select top 1 c.cokey from component c where c.mukey=mapunit.mukey order by comppct_r desc)

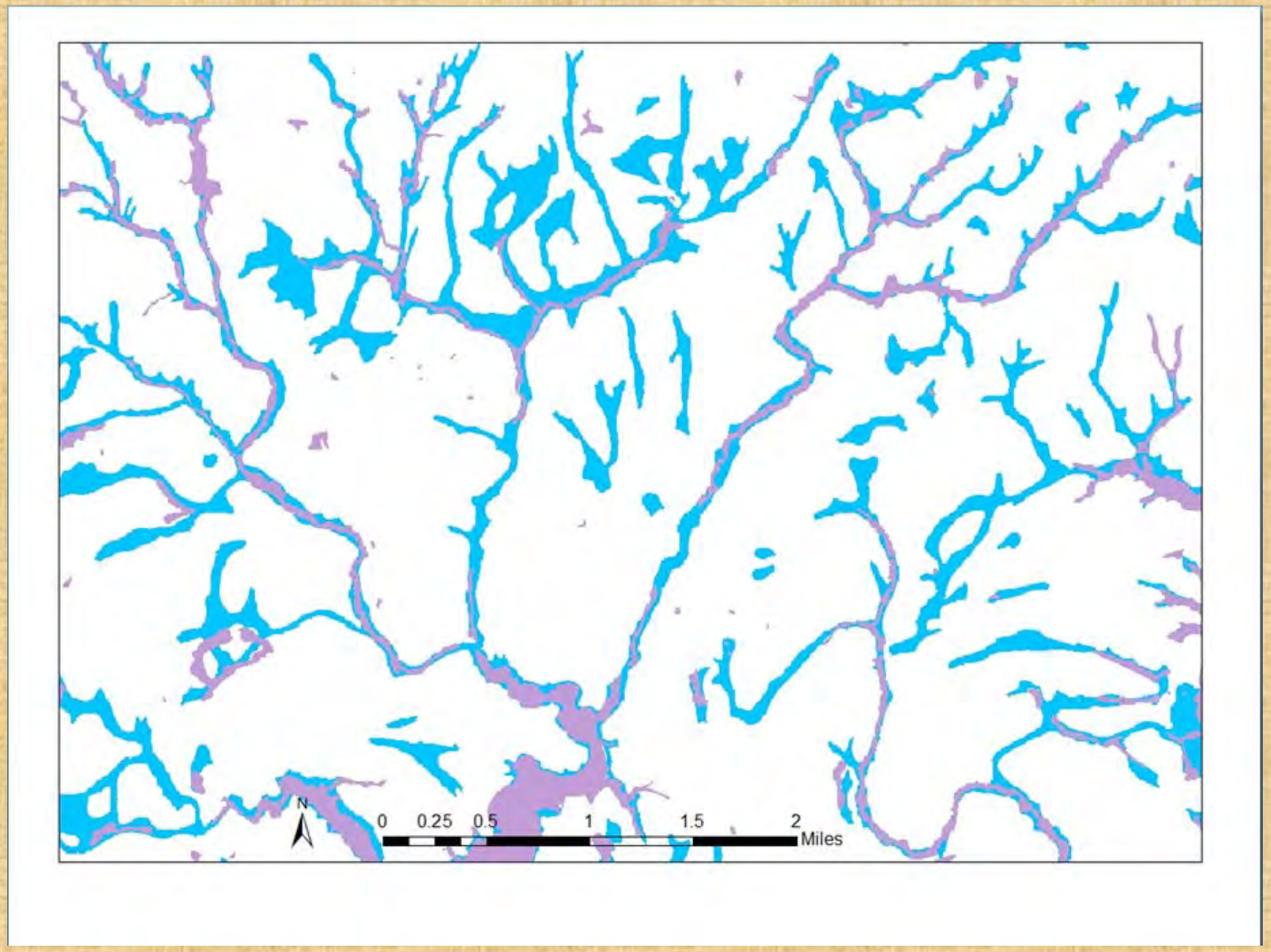
Developed by: Sharon W. Waltman, USDA-NRCS

Discussion – Location and Hydrology

- PWSL are those "hydric" clusters that are:

1) adjacent to an NWI unit, oralong the same stream system, or
2) occur upland of a levee or near a canal, or
3) on geomorphic positions where having wetland hydrology makes sense, or
4) National Hydrography Data (NHD) or SSURGO point or line features indicate ditches, drains, springs, seeps, or
5) NHD swamp or marsh symbols orwater presence, or
6) the map unit phase name includes, for example: "*high water table, poorly drained, strongly saline, slightly wet, ditched, protected, or drained*", or
7) TWI indicated a depression to be filled, or a high wetness index, or
8) the geomorphic position is, for example: "*depressional*" or "*salt flats*"

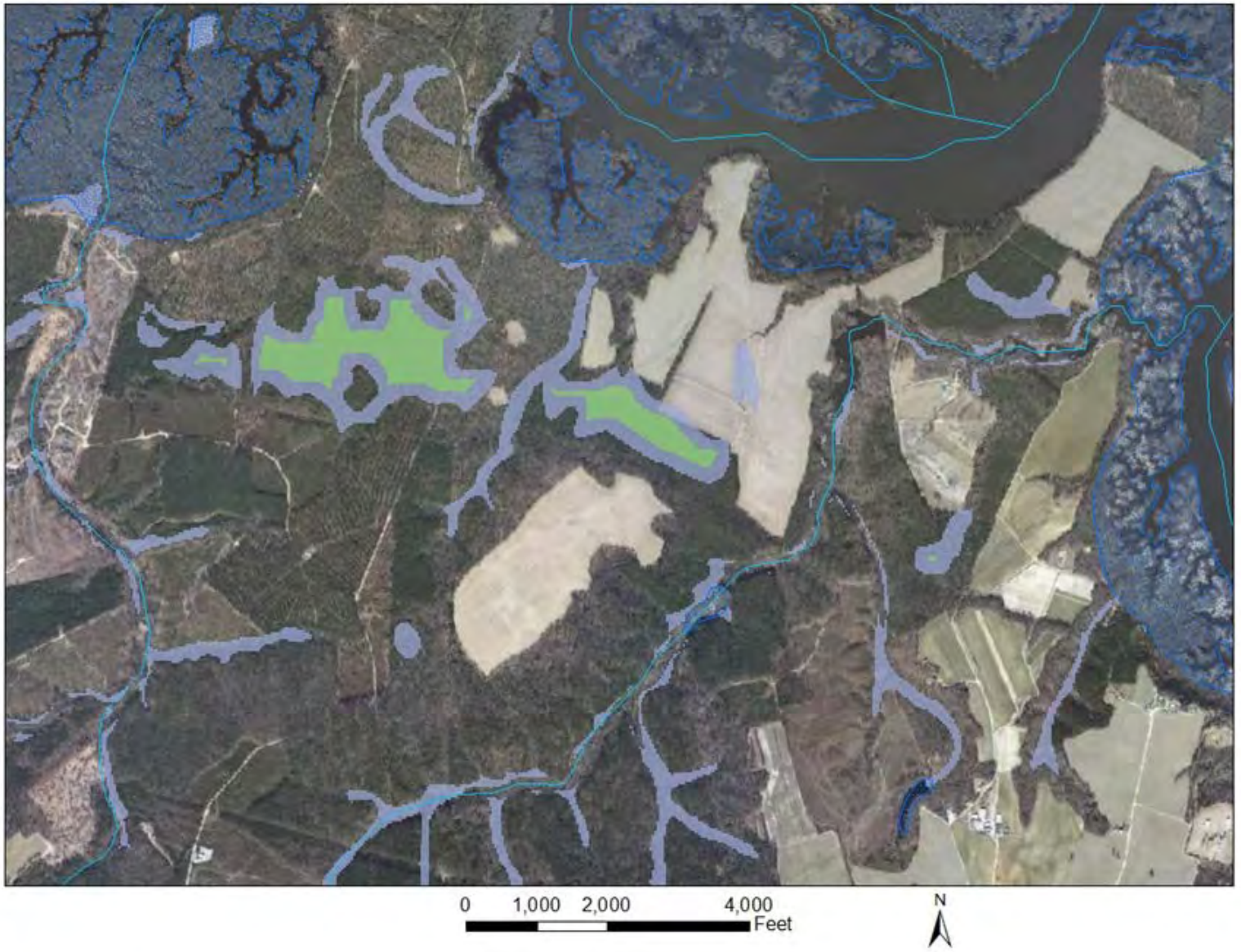
View of the major component hydric soils (blue) and the NWI wetlands (purple) for one section of Charles City County, VA



Discussion - Vegetation

- Some cropland and pasture were not inspected as closely by NWI mappers.
- Find a PWSL "hydric" cluster using remote sensing or that extend away from an NWI polygon across a linear boundary.
- Find areas of cropland or pasture with a PWSL "hydric" cluster and some evidence of current or former wetland hydrology.
- Find areas of trees killed by drowning in a PWSL "hydric" cluster.
- Find areas of recently cleared vegetation in a PWSL "hydric" cluster adjacent to NWI polygons, using time-series Landsat imagery.

NHD streams, clear blue NWI, purple PWSL



Ancillary Data Sets

- Landsat
- NAIP
- LiDAR
- National Land Cover Data
- Nat. Agr. Stat. Serv. (NASS) 2010 Cropland Data Layer
- National Hydrography Data set
- TIGER data
- Major Land Resource Area (MLRA)
- Ecoregion
- Drainage Districts and HUC Watershed maps

Future Activites

- We will be developing a tutorial to step people through a simple GIS exercise. The tutorial will resemble a standard Windows® help guide that comes with most major software, and it will be posted on the ASWM web site. This is not intended to replace the USDA-NRCS User's Guide, but to supplement it for ease of use.
- The exercise will begin with linking the tables together using Microsoft Access, then linking the tabular with the spatial data.
- A grid map of the hydric soils will be made using the GIS.
- When available, we will add the Valu table that sums the percent composition of hydric soils for each map unit.

Contact Information

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Blacksburg, VA 24061

540-231-9784
john.galbraith@vt.edu