San Francisco Estuary Invasive Spartina Project

Preserving native wetlands

Coastal Conservancy

Monitoring a Declining, Hybridizing Weed

Ingrid Hogle

Monitoring Program Manager

Outline

- Invasive Spartina Project (ISP)
- GPS for Monitoring
- GIS for Monitoring
- GIS for Mapping
- GIS for Decision Support
- Q & A

What is invasive *Spartina*?

Spartina is a cordgrass that grows in salt marshes, mudflats and brackish channels

Four introduced species of *Spartina* invading San Francisco Bay

Spartina alterniflora and hybrids

Spartina densiflora

Spartina anglica

Spartina patens

One native species (*Spartina foliosa*) occurs in San Francisco Bay marshes

Occupies specific niches in the marsh, balanced with the other important parts of the ecosystem (unvegetated mudflats, healthy channels, pickleweed mid-marsh, etc.)

Why is non-native Cordgrass a Problem ?

Degrades endangered species habitat

Hybridizes with native Pacific cordgrass

Fills in restoration sites

Degrades flood control capacity

The Invasive *Spartina* Project

- Created in 2000 by the Coastal Conservancy and the USFWS
- Coordinate Estuary-wide *Spartina* monitoring and control efforts
- Long term goals: eradicate (eliminate) invasive *Spartina* from the San Francisco Estuary.

Control Program

Monitoring Program

- Genetic testing
- Inventory and mapping
- Treatment efficacy monitoring

Annual Challenges

1. Monitoring Design
2. Spatial Data Preparation/Collection
3. Identification of Hybrids
4. Data Processing, Viewing, Editing
5. Map Production
6. Decision Support

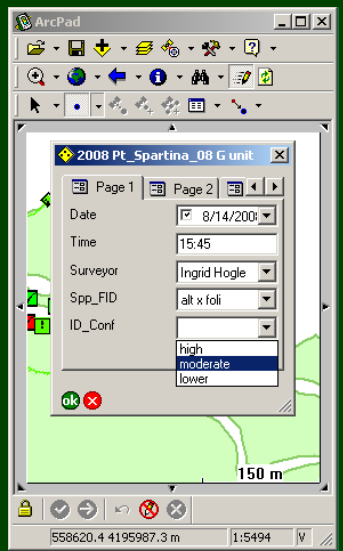
Monitoring Design

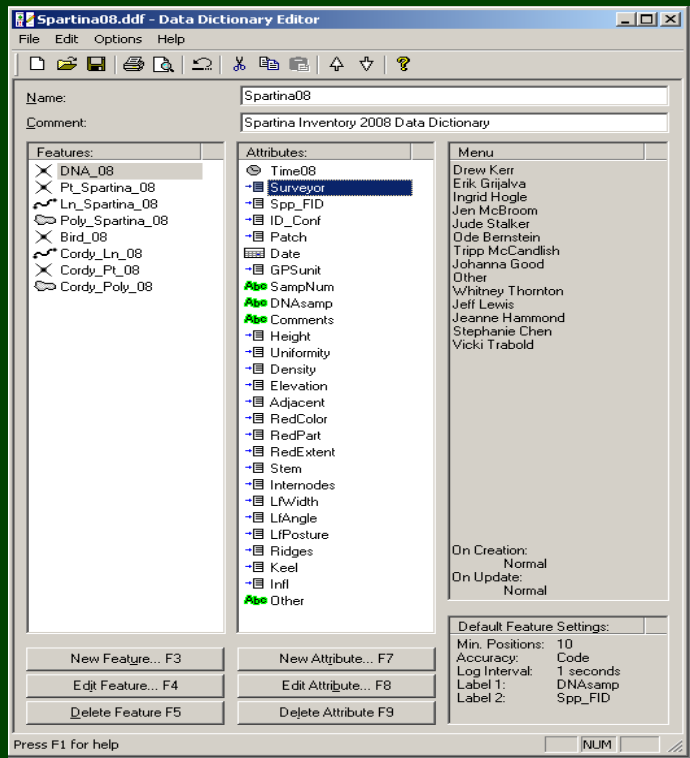
- Annual **Inventory**
  - *New Features Every Year*
  - Points, Lines & Polygons
  - Spatial Grids
- Annual **Sampling**
  - *Permanent Plots*

Genetic Testing

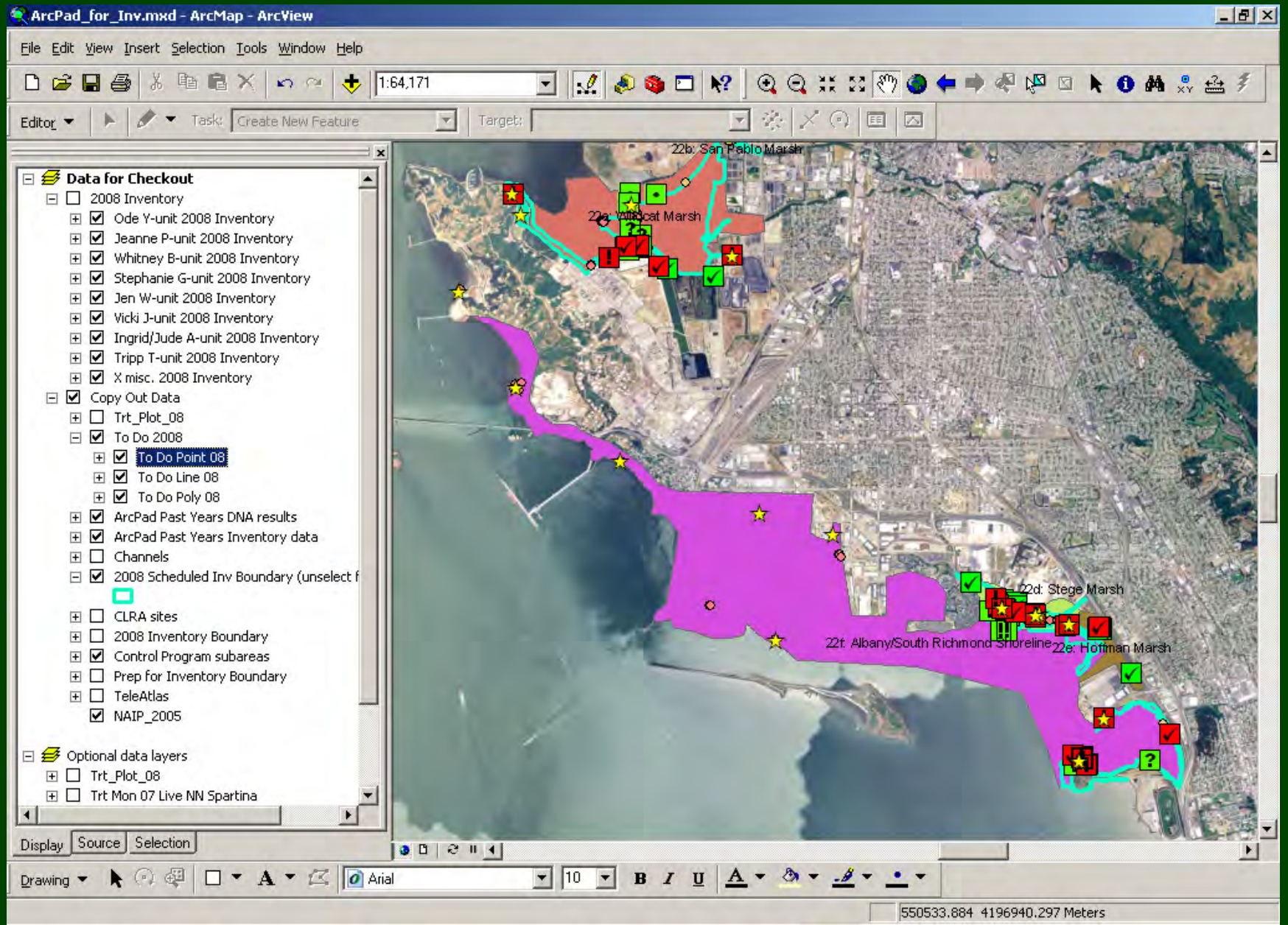
Spatial Data Collection Methods

- Handheld GPS units or Tablet PC
- ArcPad or TerraSync Software
- Map of past years' data
- Customized data dictionary
- Points, lines & polygons
- Grid cells

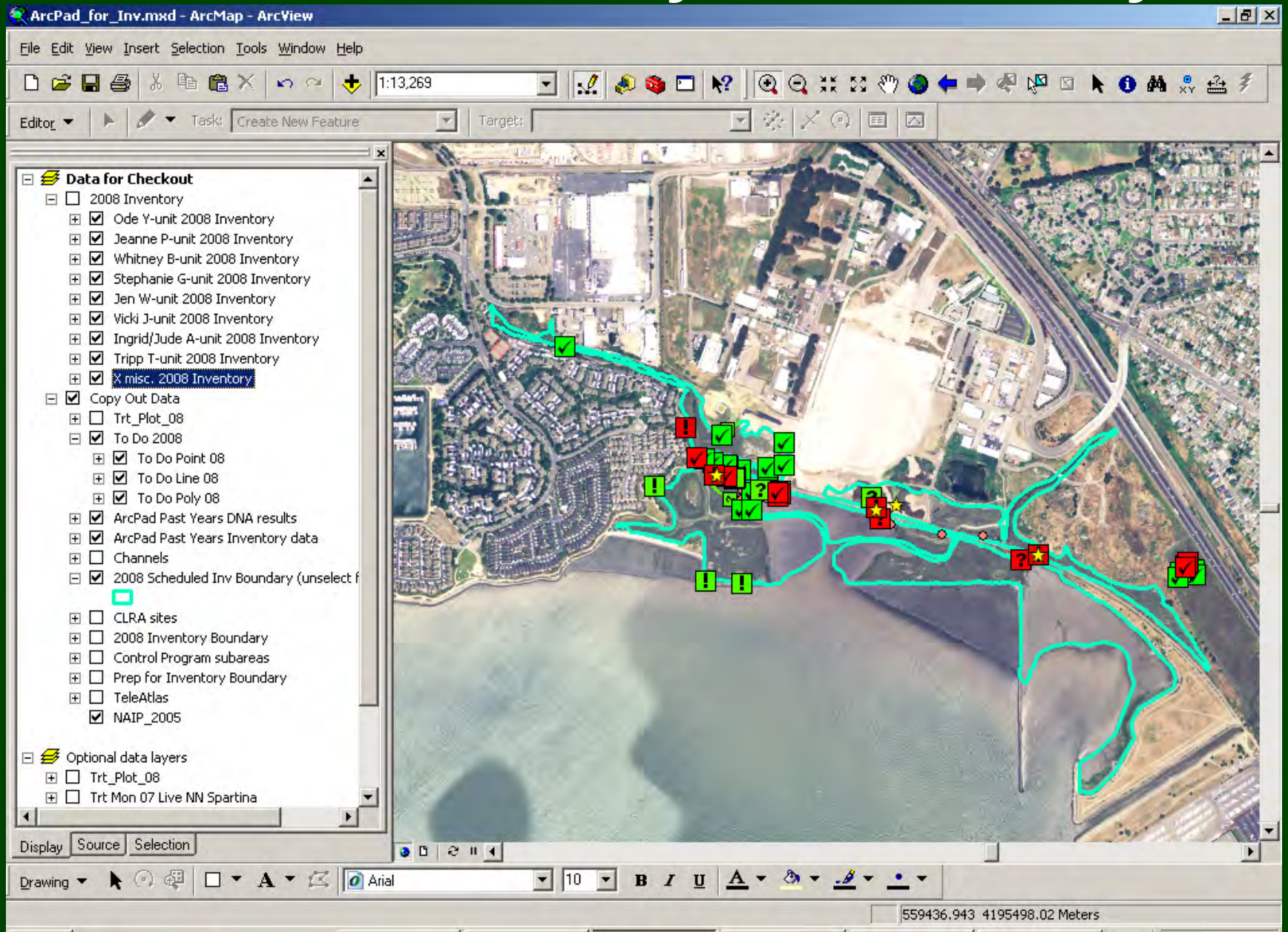




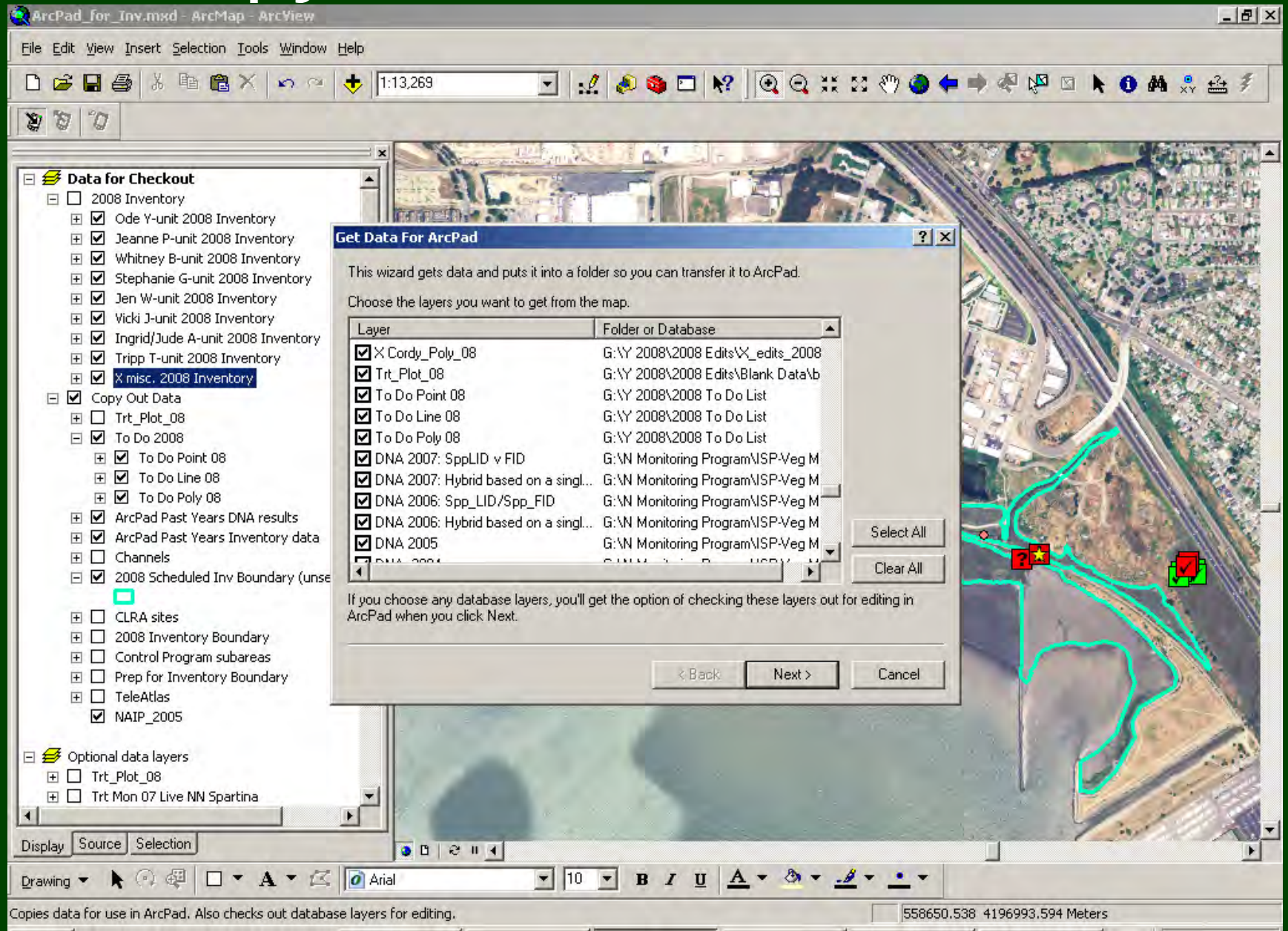
ArcPad Data CheckOut



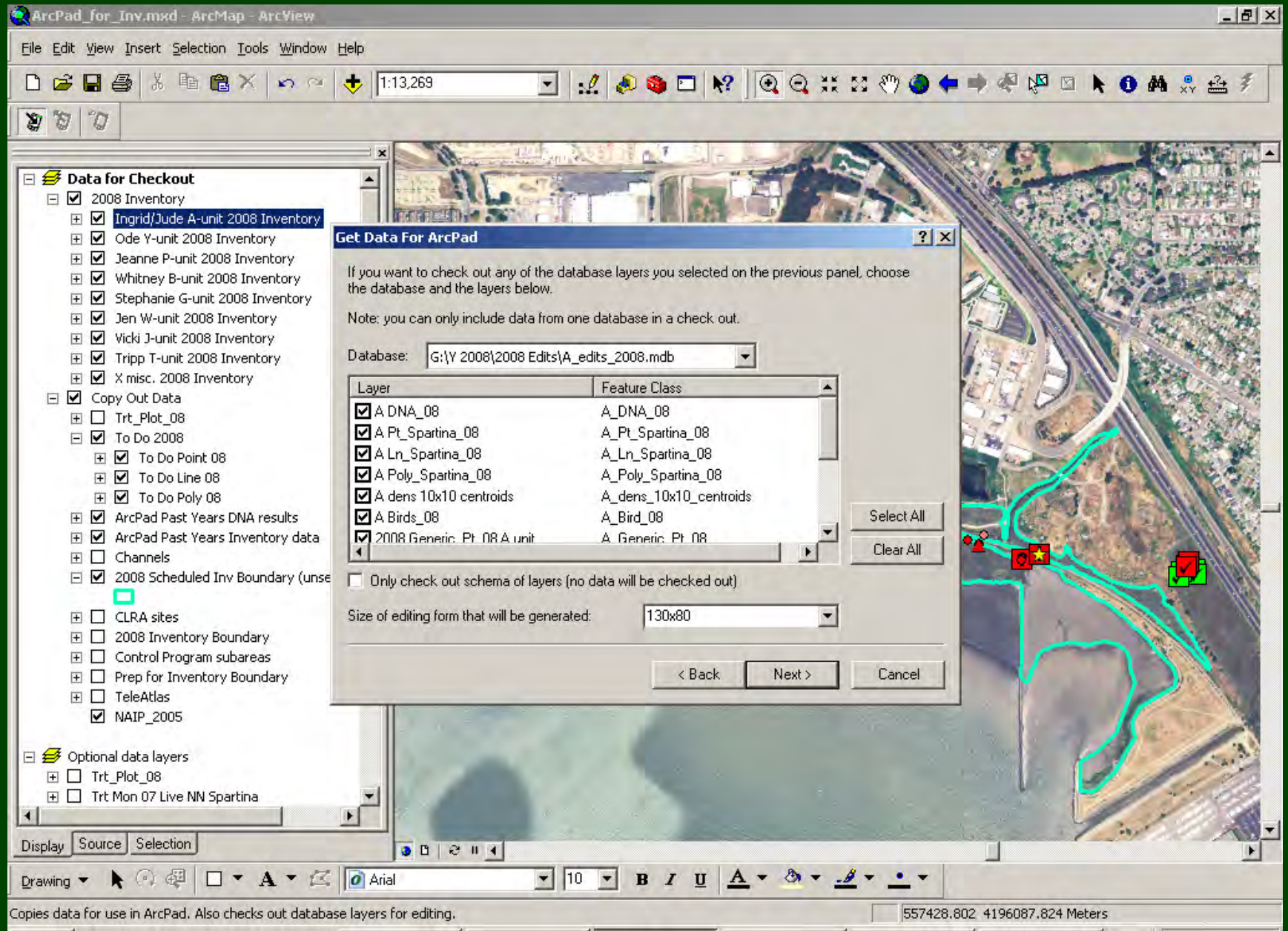
Zoom to Today's Boundary



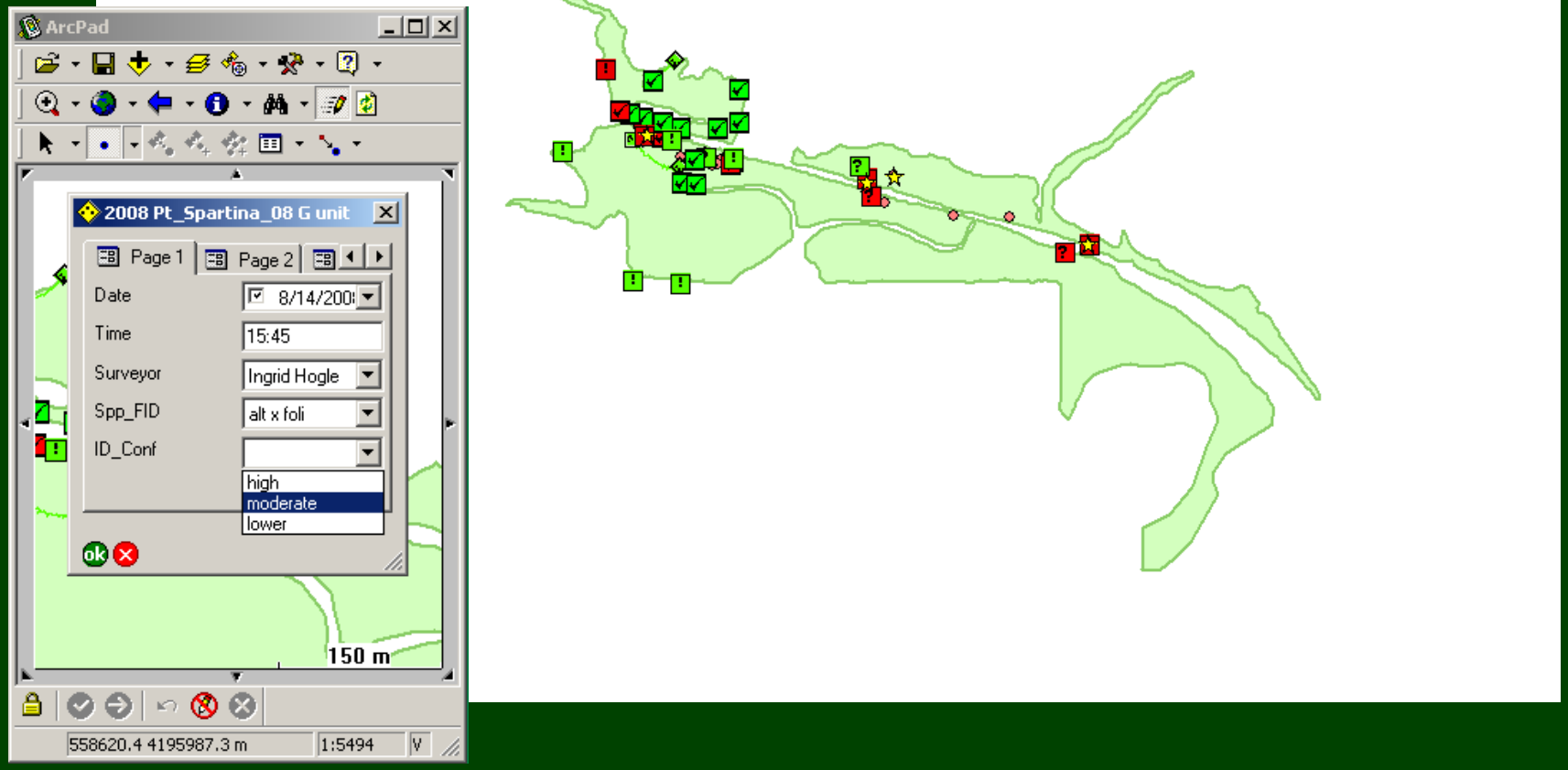
Copy Out Data to ArcPad



Check Out Data for ArcPad



ArcPad Project on GPS Unit

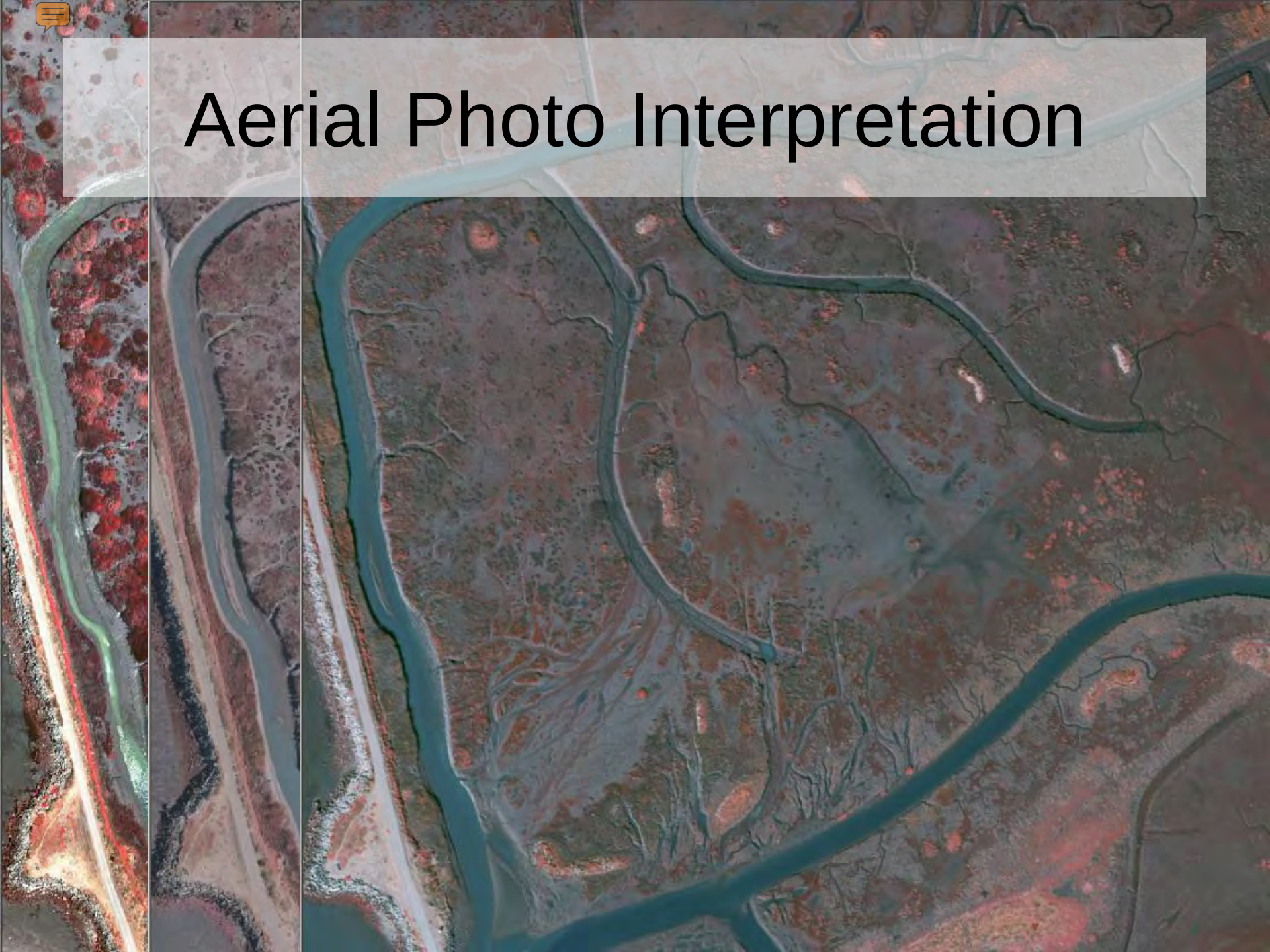


Stege Marsh Inventory Map

Spatial Data Collection Methods

- Land
  - Foot, Bicycle
- Water
  - Kayak, Airboat, Power boat
- Air
  - Airplane, Helicopter
- Office
  - Digitizing Tablet & GIS

Aerial Photo Interpretation

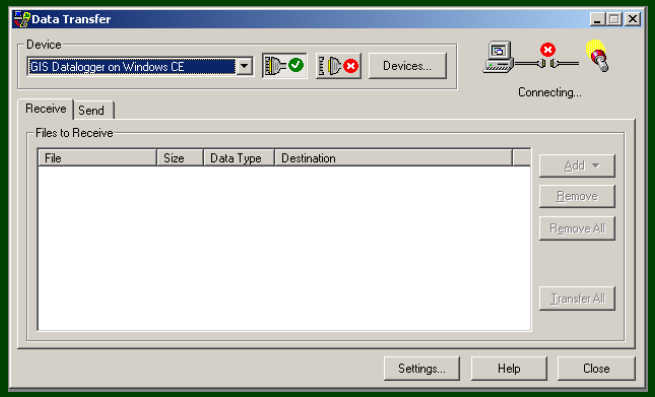


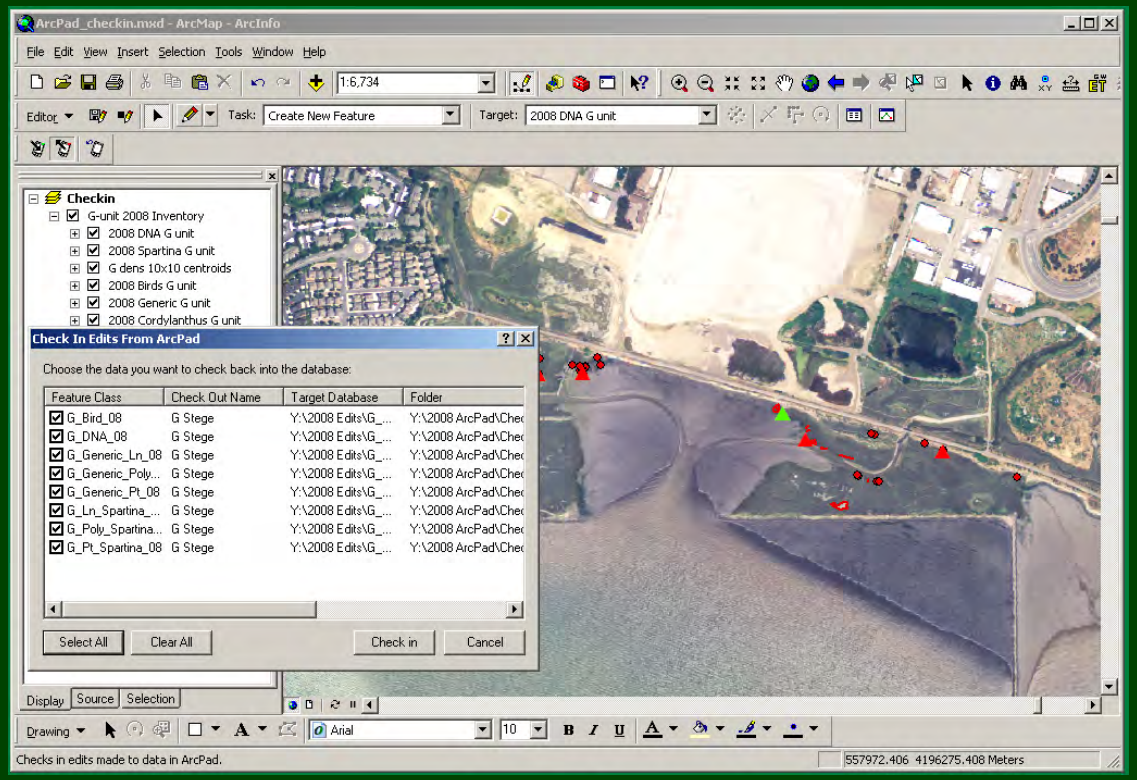
Oro Loma Marsh, Hayward Regional Shoreline

Helicopter Monitoring

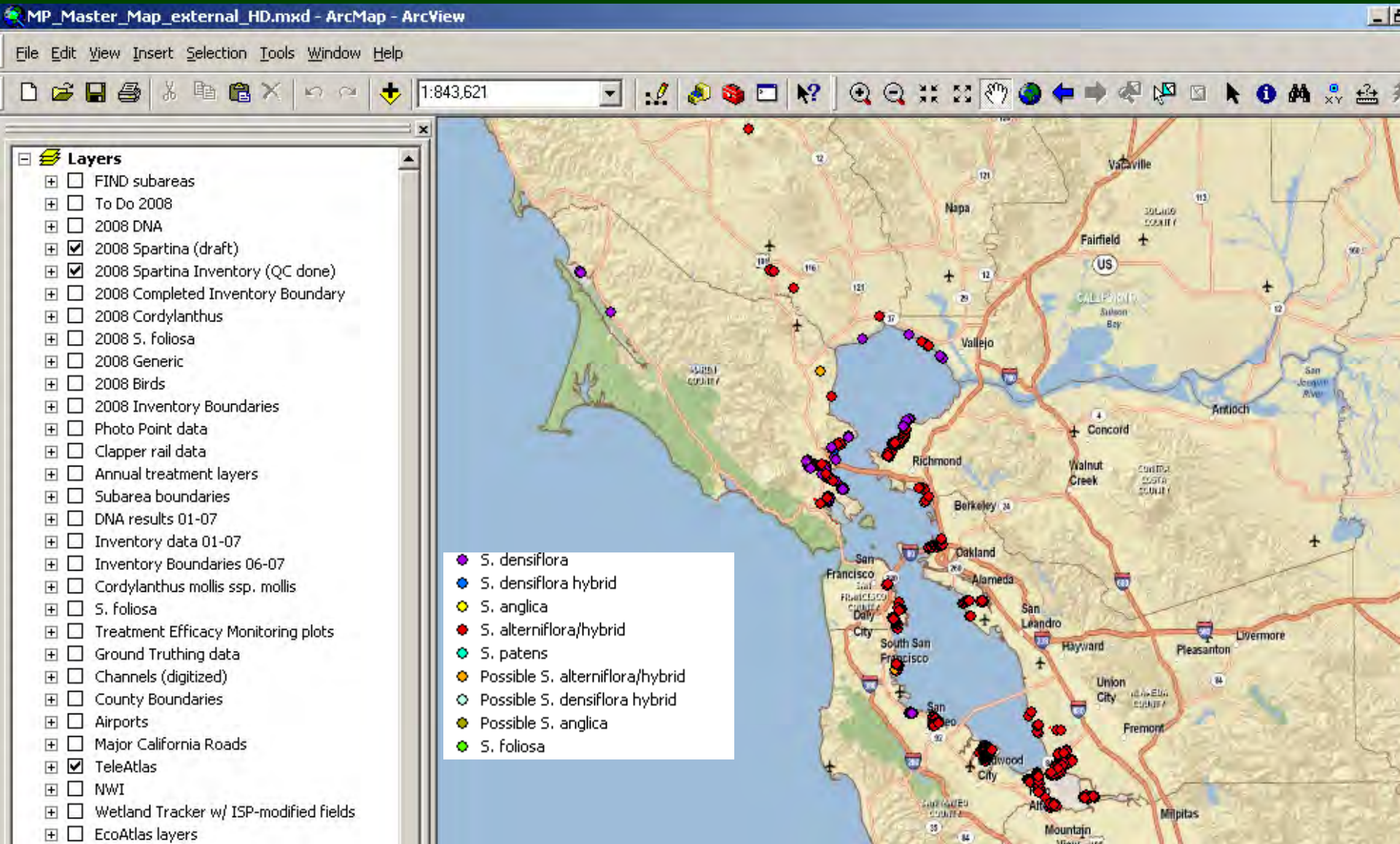
Data Processing

- Transfer from GPS to Desktop
- Differential Correction (or not)
- Load or Checkin to Geodatabase(s)

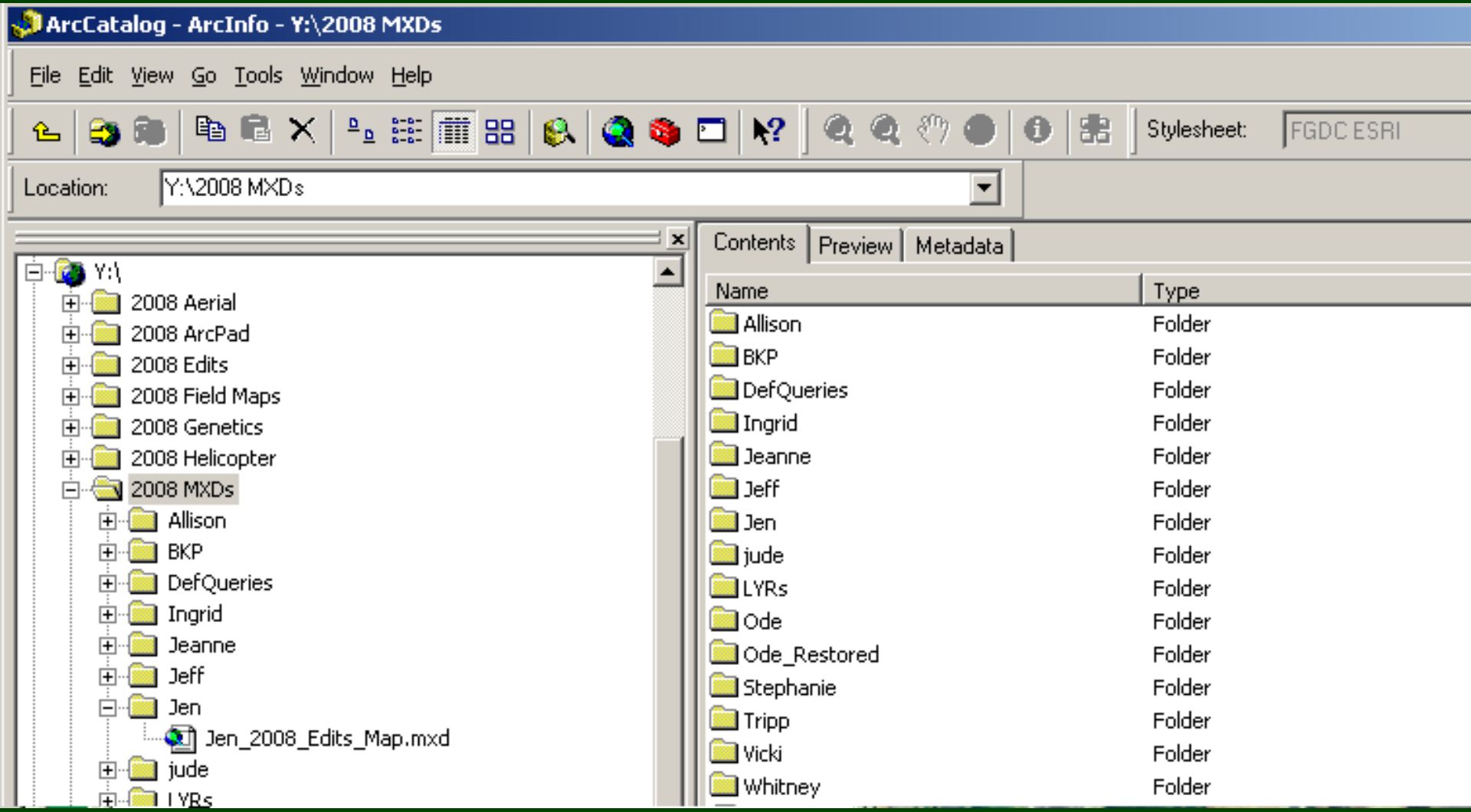




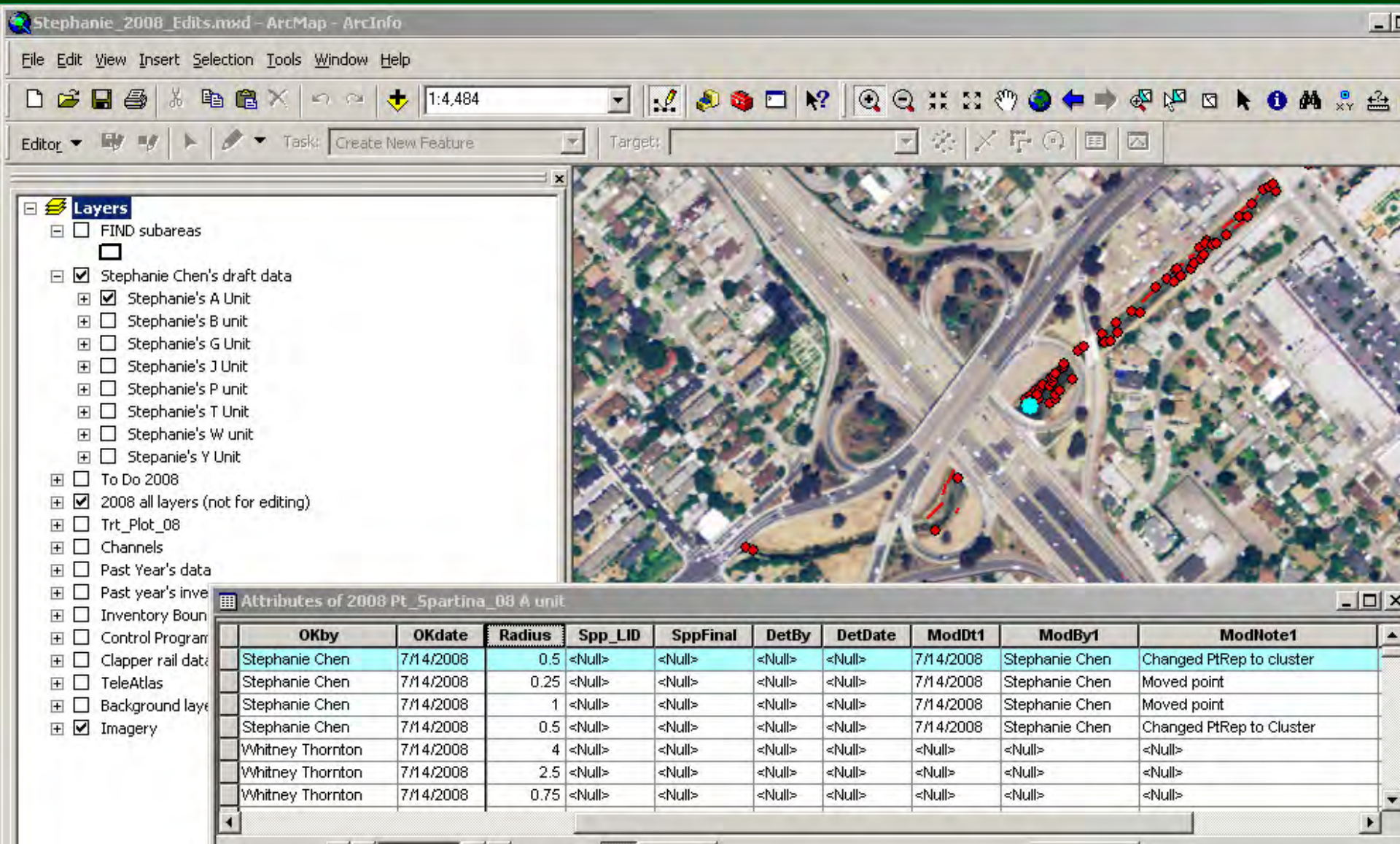
View Data in ArcMap



Data Editing: Individual edit maps for each field biologist



Data Editing: Columns to record how, what, by whom and when edits were made



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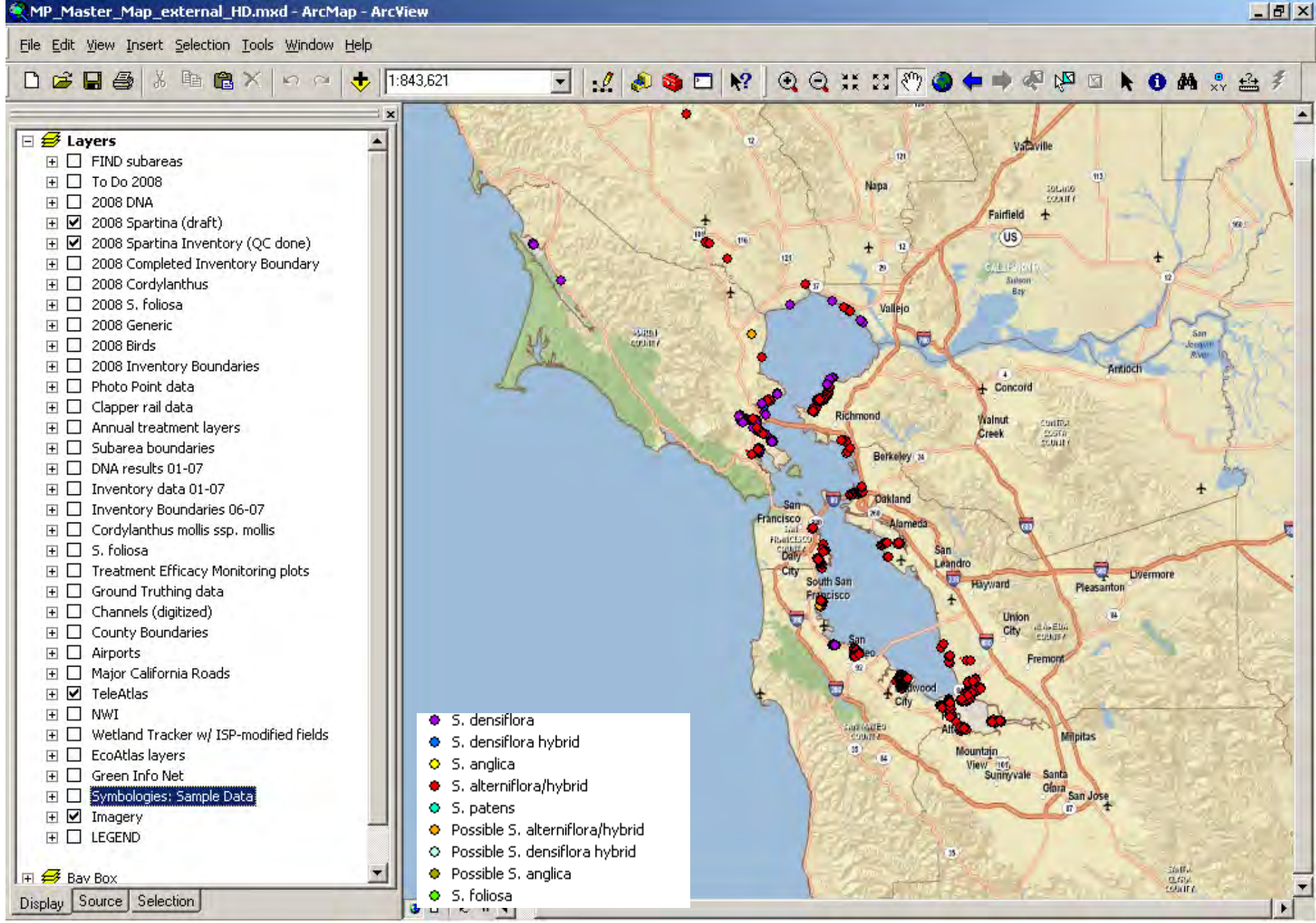
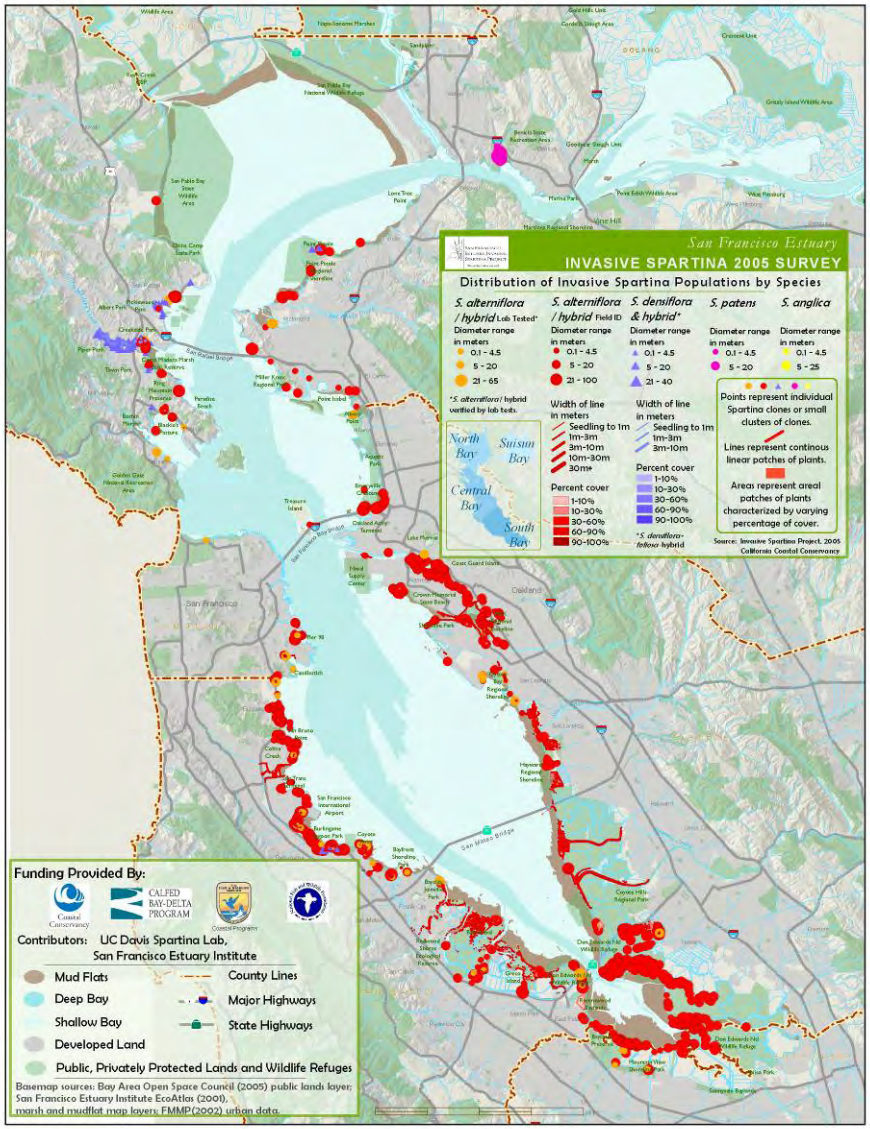
Stephanie Chen	7/14/2008	0.25	<Null>	<Null>	<Null>	<Null>	7/14/2008	Stephanie Chen	Moved point
Stephanie Chen	7/14/2008	1	<Null>	<Null>	<Null>	<Null>	7/14/2008	Stephanie Chen	Moved point
Stephanie Chen	7/14/2008	0.5	<Null>	<Null>	<Null>	<Null>	7/14/2008	Stephanie Chen	Changed PtRep to Cluster
Whitney Thornton	7/14/2008	4	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Whitney Thornton	7/14/2008	2.5	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
Whitney Thornton	7/14/2008	0.75	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

Map Production

- Interactive map (used in house…a LOT)
- Field maps (to inform monitoring)
- Reporting maps (to share with partners, others)


MP_Master_Map_external_HD.mxd - ArcMap - ArcView
File Edit View Insert Selection Tools Window Help
1:843,621
Layers
FIND subareas
To Do 2008
2008 DNA
2008 Spartina (draft)
2008 Spartina Inventory (QC done)
2008 Completed Inventory Boundary
2008 Cordylanthus
2008 S. foliosa
2008 Generic
2008 Birds
2008 Inventory Boundaries
Photo Point data
Clapper rail data
Annual treatment layers
Subarea boundaries
DNA results 01-07
Inventory data 01-07
Inventory Boundaries 06-07
Cordylanthus mollis ssp. mollis
S. foliosa
Treatment Efficacy Monitoring plots
Ground Truthing data
Channels (digitized)
County Boundaries
Airports
Major California Roads
TeleAtlas
NWI
Wetland Tracker w/ ISP-modified fields
EcoAtlas layers
Green Info Net
Symbologies: Sample Data
Imagery
LEGEND
Bay Box
Display
Source
Selection
S. densiflora
S. densiflora hybrid
S. anglica
S. alterniflora/hybrid
S. patens
Possible S. alterniflora/hybrid
Possible S. densiflora hybrid
Possible S. anglica
S. foliosa
Vacaville
Napa
Fairfield
Vallejo
Antioch
Concord
Richmond
Walnut Creek
Berkeley
Oakland
San Francisco
Alameda
San Leandro
Daly City
South San Francisco
Hayward
Pleasanton
Livermore
Union City
Fremont
Milpitas
Mountain View
Sunnyvale
Santa Clara
San Jose

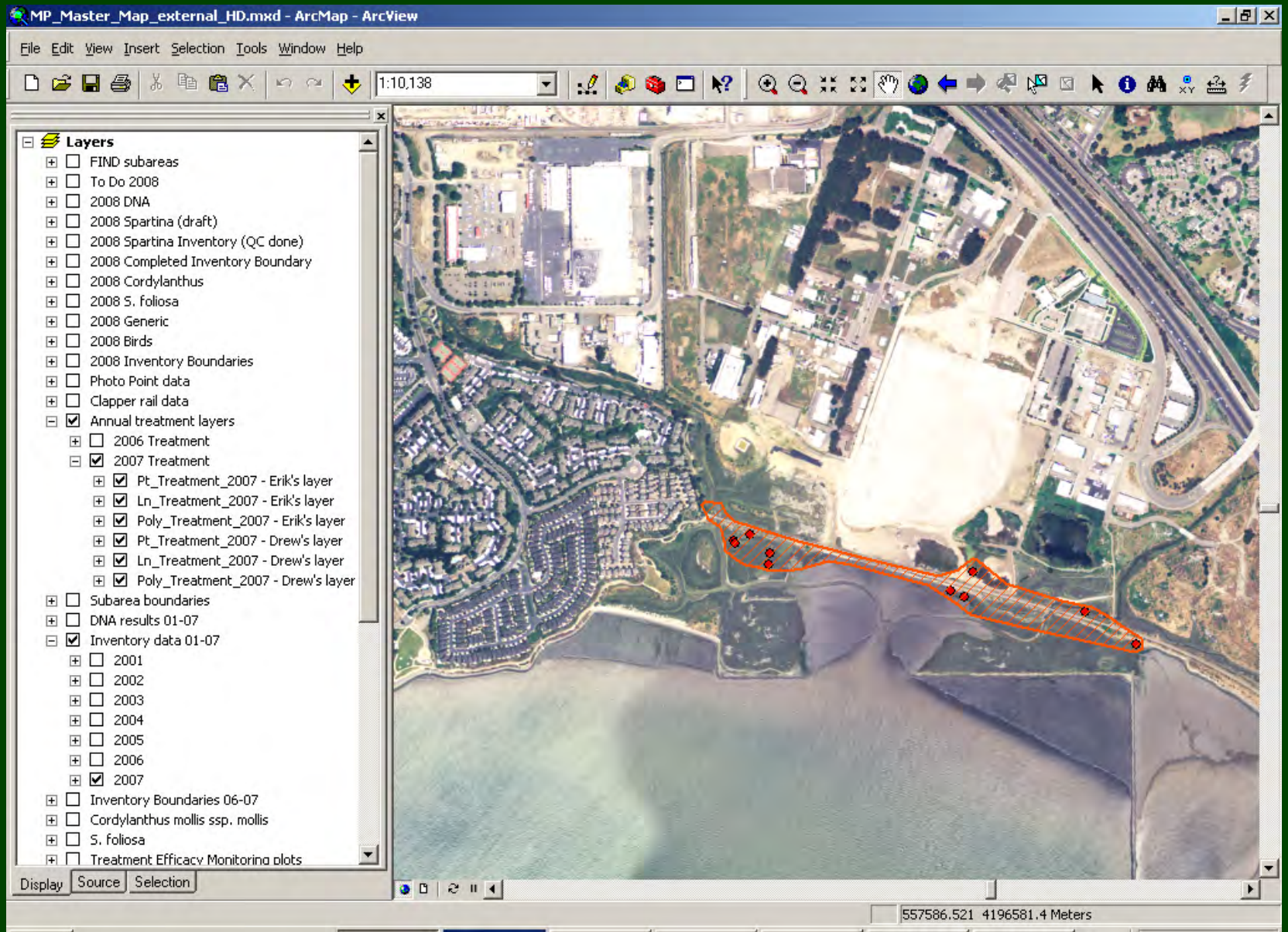
Reporting Maps



Decision Support

- Maps
- Lab results
- Summary data

Where to Treat



What to Treat: Lab Results

Legend: Genetic Results

- Confirmed *S. foliosa*
- *S. foliosa* lab ID, other spp field ID
- *S. foliosa* lab ID, unknown spp field ID
- Confirmed *S. alterniflora*/hybrid
- *S. alterniflora*/hybrid lab ID, unknown spp field ID
- *S. alterniflora*/hybrid lab ID, other spp field ID
- *S. alterniflora*/hybrid lab ID based on lack of a single *S. foliosa* marker

How Much to Treat

Selected Attributes of *Pt_Spartina_07 species centers

Comments	DNAcollect	LIDsample	Spp_LID	SppFinal	PctCov	Net_m2	Gross_m2
changed to S. foliosa based on lab ID	Yes	<Null>	S. foliosa	S. foliosa	0.55	<Null>	<Null>
DNA sample lost?	Yes	?	No Results	S. alterniflora/hybrid	0.25	4.90625	19.625
	No	<Null>	<Null>	S. alterniflora/hybrid	0.075	5.8875	78.5
	No	<Null>	<Null>	S. alterniflora/hybrid	0.075	0.529875	7.065
	No	<Null>	<Null>	S. alterniflora/hybrid	0.55	<Null>	<Null>
	yes	1116T1, 827B2	S. foliosa	S. foliosa	0.45	<Null>	<Null>
	No	<Null>	<Null>	S. alterniflora/hybrid	0.55	3.88575	7.065
green,long inf, red stem, upright	No	<Null>	<Null>	S. alterniflora/hybrid	0.25	4.90625	19.625
	No	<Null>	<Null>	S. alterniflora/hybrid	0.15	0.471	3.14
	yes	827B2	S. foliosa	S. foliosa	0.25	<Null>	<Null>
	No	<Null>	<Null>	S. alterniflora/hybrid	0.45	8.83125	19.625
	No	<Null>	<Null>	S. alterniflora/hybrid	0.55	6.908	12.56
	No	<Null>	<Null>	S. alterniflora/hybrid	0.95	47.728	50.24

Record: 0 Show: All Selected Records (13 out of *2000 Selected) Options

Questions?

THANK YOU

San Francisco Estuary Invasive Spartina Project
Preserving native wetlands

ISP Project Director – *Peggy Olofson*
ISP Project Manager – *Maxene Spellman*
ISP Field Operations Managers – *Erik Grijalva & Drew Kerr*
ISP Clapper Rail Monitoring Program Manager – *Jen McBroom*
ISP Office Administrator – *Stephanie Erikson*
ISP Field Staff – *Tripp McCandlish, Ode Bernstein, Jude Stalker, Jeff Lewis, Jeanne Hammond, Whitney Thornton, Vicki Trabold, Stephanie Chen, Allison Nelson, Johanna Good*
Funders – *California State Coastal Conservancy, CALFED*

Coastal Conservancy