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The National Institute *of* Invasive Species Science

Integrating Invasive Species Data:

Solutions for Citizen Scientists

Catherine Jarnevich
Fort Collins Science Center
U.S. Geological Survey

Tom Stohlgren, Tracy Davern, Geneva Chong (USGS), Alycia Crall, Jim Graham, Greg Newman, Paul Evangelista, Sara Simonson, David Barnett, Mohammed Kalkhan, Rick Shory, Hilary Drucker, Sunil Kumar, Nate Ament (CSU/NREL)

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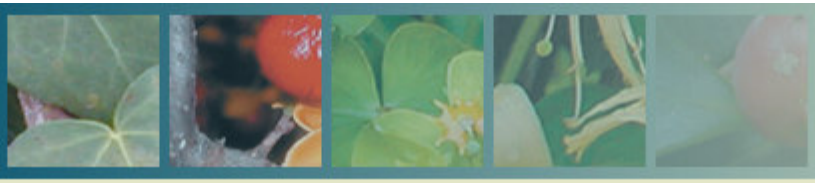
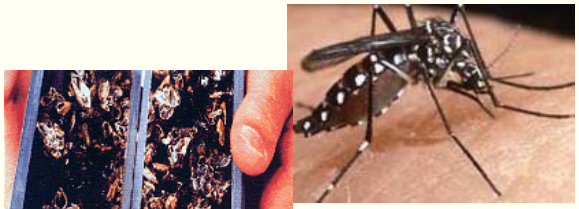


Global Organism Detection & Monitoring

The Problem

- Invasive species
  - Impact biodiversity, ecosystem function, human health, and the economy
- Issues of Data Synergy
  - Large data gaps (spatial and temporal)
  - Crosier and Stohlgren 2004 (Weed Technology)
  - Crall et al. 2006 (Frontiers in Ecology and the Environment)
    - 319 databases
    - 43% not online
- Why Not Share Data
  - Sensitive Data
  - Inability to Share



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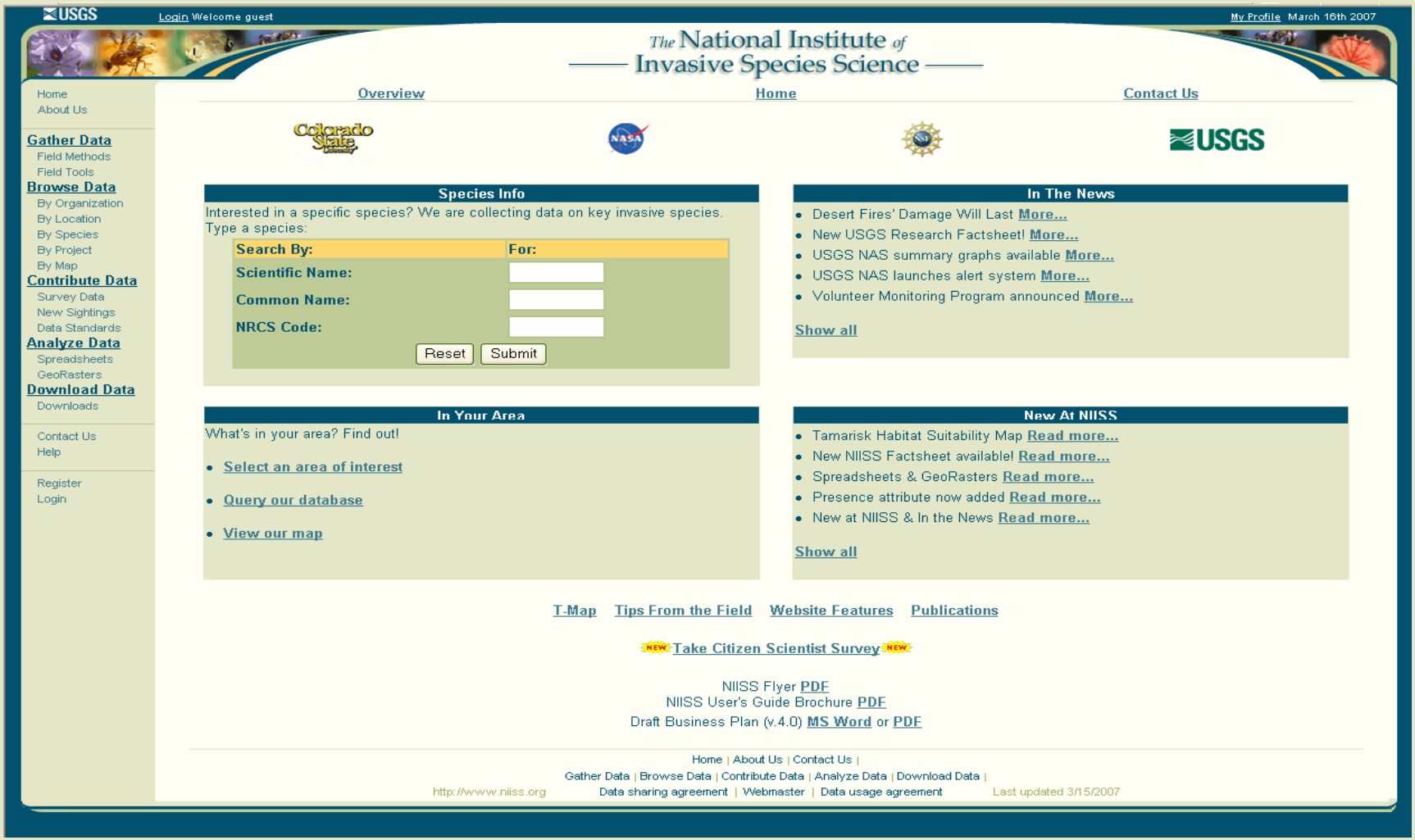

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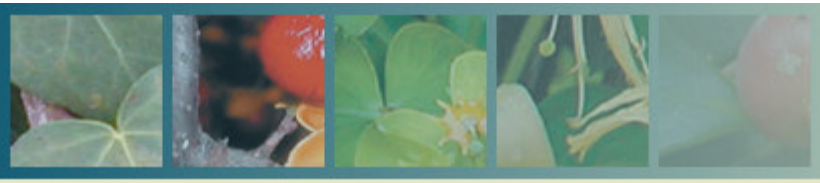

User Levels

Global Organism Detection & Monitoring

- Guest: anyone visiting the website
  - View main website pages, data, and maps
  - Register
- User: anyone registered
  - Request new user level
  - Download Field Tools (EcoNab, VegSurvey, and Envelope)
  - Analyze, print, and download data and maps
- Tester
  - Test website
- Instigator
  - Create a new project
- Expert
  - Create new species, species profiles, etc

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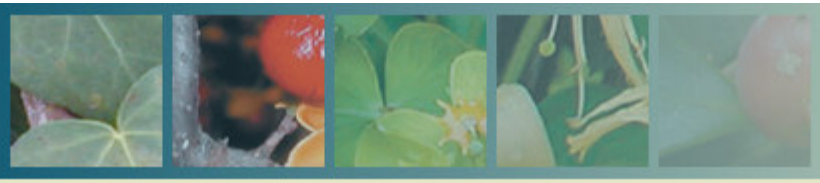

Project Roles

- Project Contributor
  - Add survey data
  - Edit data they contributed
- Project Reviewer
  - Flag questionable data
- Project Authority
  - Delete, correct, or validate flagged data
- Project Manager
  - Add/ remove contributors, reviewers, and authorities to/from a project
  - Edit project information and data

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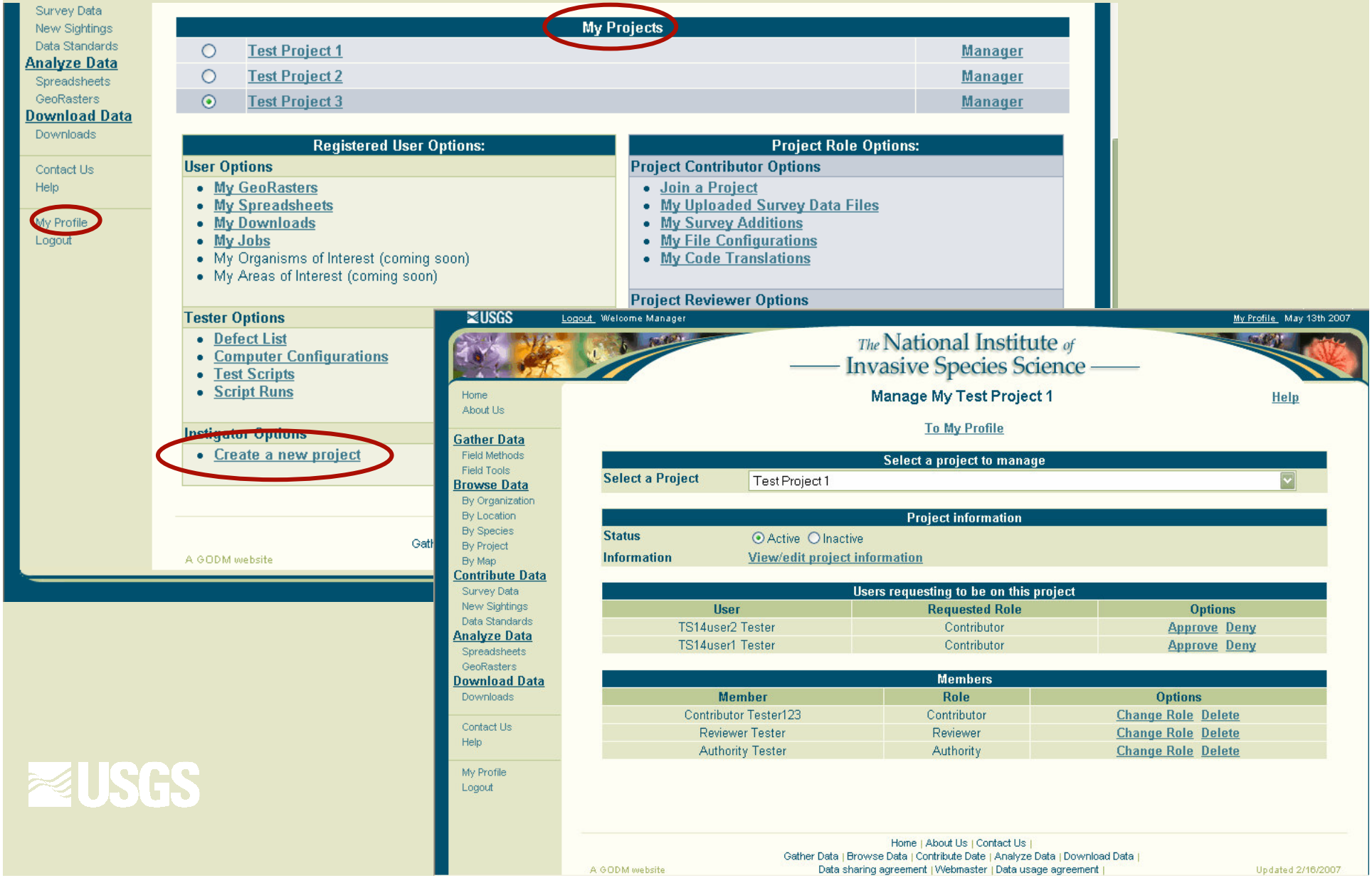
User and Project Options



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Citizen Scientist tools

- Geared towards citizen scientist organizations in need of a data management system
- Proposed New Features
  - Online tutorials
  - Monitoring protocols
  - QA/QC protocols
  - Customizable data entry forms
  - Cheap, easy to use digital field tools
  - School course curriculums

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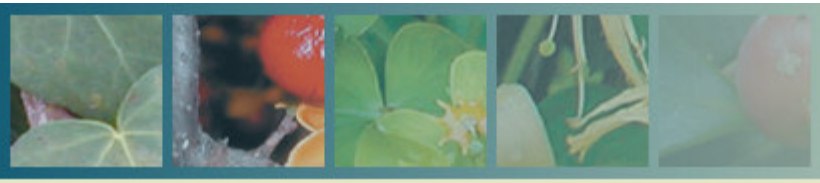
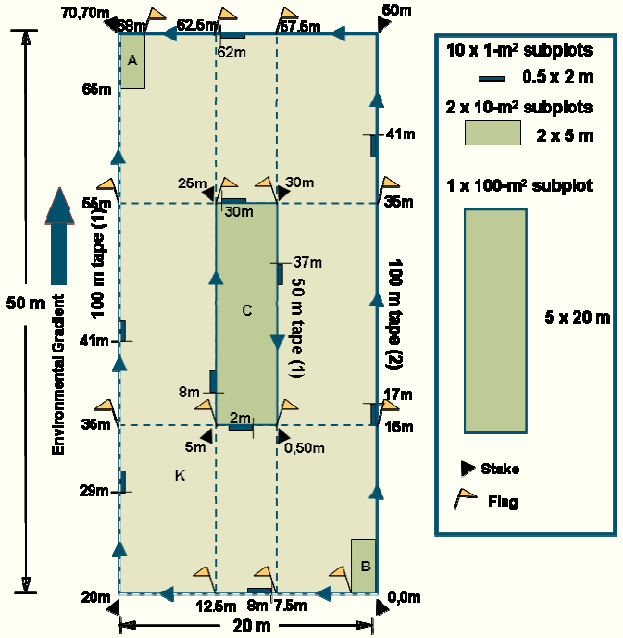
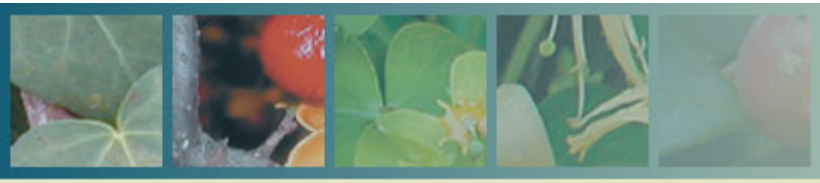


Gather Data

- Field Methods
  - Description
  - Equipment needed
  - How to setup
  - References
- Field Tools
  - Project Envelope
    - use with ArcMap
    - survey full environmental range of species
  - EcoNab
    - field data collection program that runs on your "Palm Pilot" PDA





Vegetation Monitoring Protocols

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Tiered Monitoring Approach

- Level 1: A simple approach; least cost and time required; collect general location and presence/absence data
- Levels 2 and 3: An approach for more experienced monitoring groups; incorporates more detailed species abundance and habitat information
- Level 4: A far more detailed approach to mapping and modeling native and non-native species distributions, primarily for researchers; expensive and time-consuming

Example Map: *Tamarix sp.* locations

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Contribute Data

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6 Ways to Contribute Data to GODM

1) GISIN exchange protocol (under development)

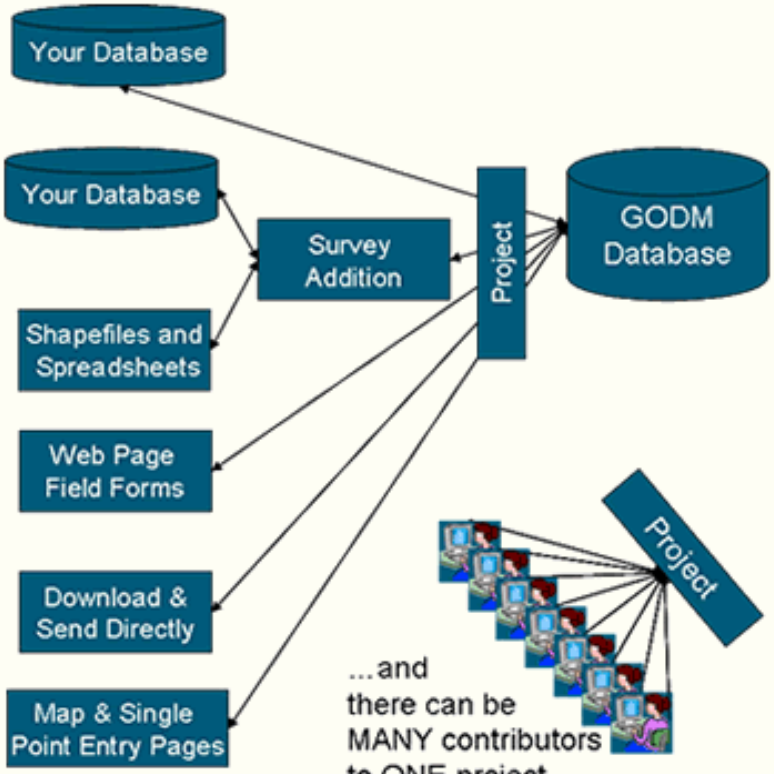
2) Your database export to spreadsheet, survey addition

3) Survey addition from shapefiles or spreadsheets

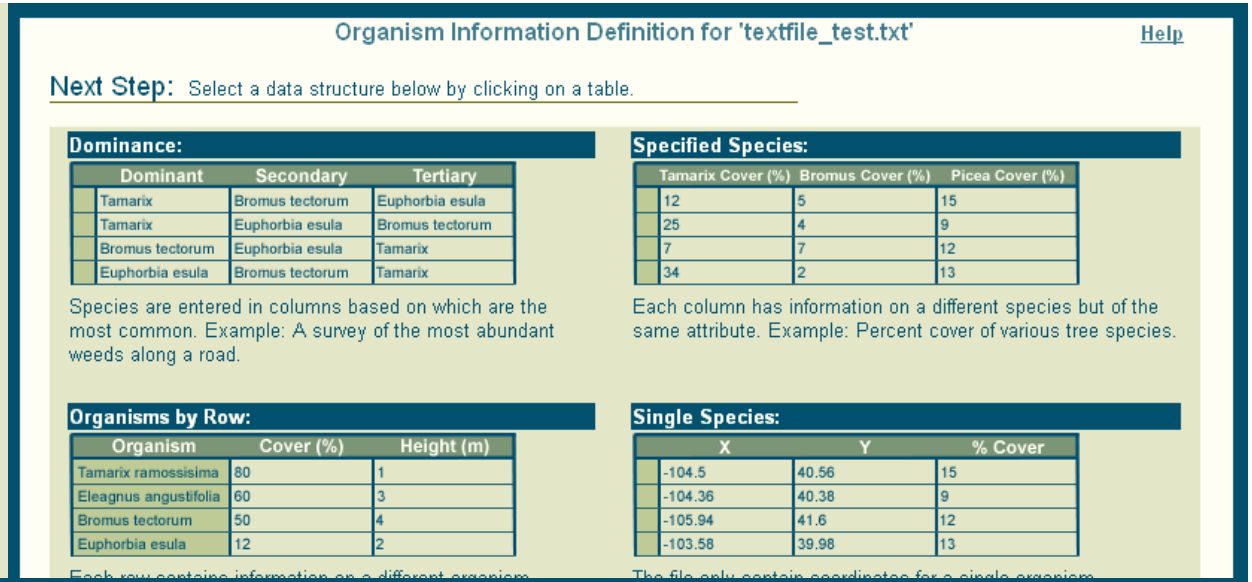
4) Field form data entry on the web (under development)

5) Direct from GPS or PDA (under development)

6) Enter single coordinates or click on map



Contribute Data: Survey Data



Organism Information Definition for 'textfile_test.txt' Help

Next Step: Select a data structure below by clicking on a table.

Dominance:

	Dominant	Secondary	Tertiary
	Tamarix	Bromus tectorum	Euphorbia esula
	Tamarix	Euphorbia esula	Bromus tectorum
	Bromus tectorum	Euphorbia esula	Tamarix
	Euphorbia esula	Bromus tectorum	Tamarix

Species are entered in columns based on which are the most common. Example: A survey of the most abundant weeds along a road.

Specified Species:

	Tamarix Cover (%)	Bromus Cover (%)	Picea Cover (%)
	12	5	15
	25	4	9
	7	7	12
	34	2	13

Each column has information on a different species but of the same attribute. Example: Percent cover of various tree species.

Organisms by Row:

Organism	Cover (%)	Height (m)
Tamarix ramossisima	80	1
Eleagnus angustifolia	60	3
Bromus tectorum	50	4
Euphorbia esula	12	2

Single Species:

	X	Y	% Cover
	-104.5	40.56	15
	-104.36	40.38	9
	-105.94	41.6	12
	-103.58	39.98	13

Describe the columns in your file

Column Has:	Column Has:	Column Has:	Column Has:	Column Has:
Organism	Organism	Treatment	Treatment	Attribute
Contains:	Contains:	Contains:	Contains:	Contains:
Organism Name	Organism Name	Control Agent	Number	Number
Format:	Format:	Value Format:	Target species column:	Species column:
Scientific Name	Scientific Name	Custom Code	DOMINANT	DOMINANT
Dominance:	Dominance:		Control agents are:	Attribute types are:
Primary (1st)	Secondary(2nd)		In another column	In next pull down menu
			Column:	Type is
			BIOCONTROL	Infested Area
			Units are:	Units are:
			In next pull down menu	In next pull down menu
			Units:	Units:
			Count per hectare	Meters Squared

DOMINANT	SECONDARY	BIOCONTROL	NUMBER	INFESTEDAR
tamarix	Elaeagnus angustifolia	Diorhabda elongata	100	100
Euphorbia esula	Descuraina sophia	Apthona lacertosa	500	1000
Euphorbia esula	Agropyron smithii	Apthona nigriscutis	500	500

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Download Data

- allows you to download organism locations as a textfile, csv file, or shapefile

West (East-West Coordinate: Float)	North (North-South Coordinate: Float)	East (Unknown: Float)	South (Unknown: Float)	Height (Attribute: Float)	Average annual precipitation, Gray (GIS Layer: Float)	Average annual temperature, Gray (GIS Layer: Float)	Minimum average annual temperature, Gray (GIS Layer: Float)	MODIS three year average EVI , Range (GIS Layer: Float)	MODIS three year average EVI , Mean (GIS Layer: Float)	MODIS three year average EVI , Date of Peak (GIS Layer: Float)
-99.969	38.858	-99.969	38.858	1.692	56.266	11.888	4.2353	2090.8	610.69	172.73
-100.07	38.814	-100.07	38.814	2.1	56.238	11.905	4.2223	1917.7	805.95	184.39
-99.938	38.714	-99.938	38.714	1.597	56.405	11.986	4.3495	2162.1	1037.4	194.96
-99.915	38.811	-99.915	38.811	1.4	56.311	11.974	4.3188	2070.4	825.44	181.42
-99.849	38.942	-99.849	38.942	1.597	58.561	11.692	4.1783	2398.4	1027.6	191.25
-100.05	38.921	-100.05	38.921	0.4	59.294	11.597	4.0366	2044.1	974.59	188.92
-99.833	38.857	-99.833	38.857	2.1	57.733	11.844	4.2797	2140.7	670.49	176.06

Input Field Data

Automatically add satellite data

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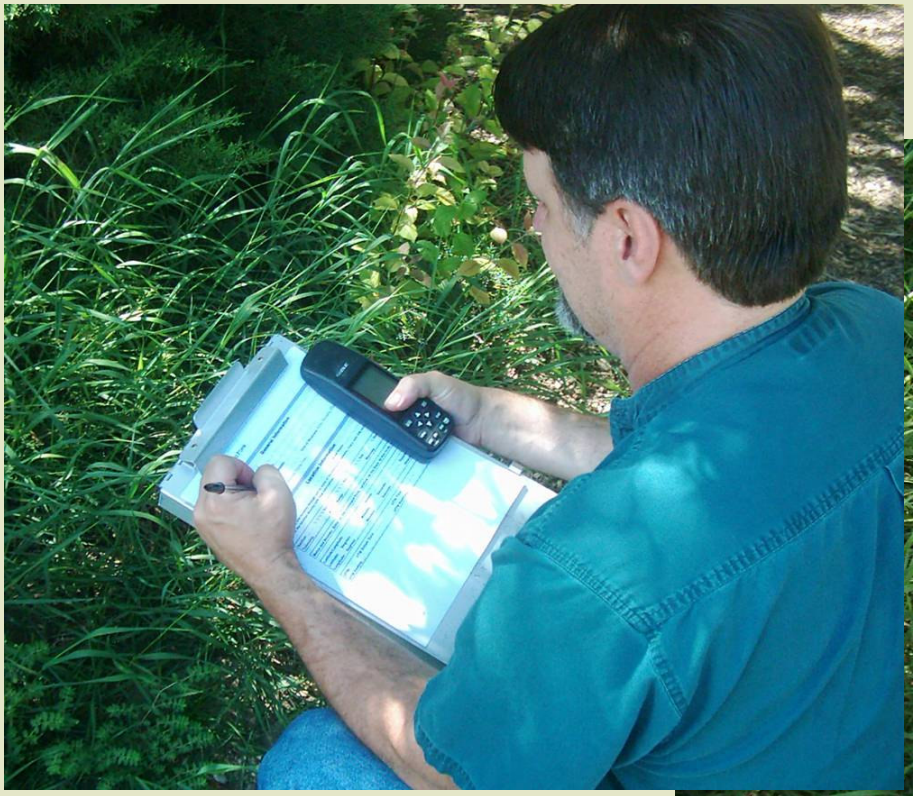
Field Tools

The Past



+ Manual entry

The Future

+ Automatic upload

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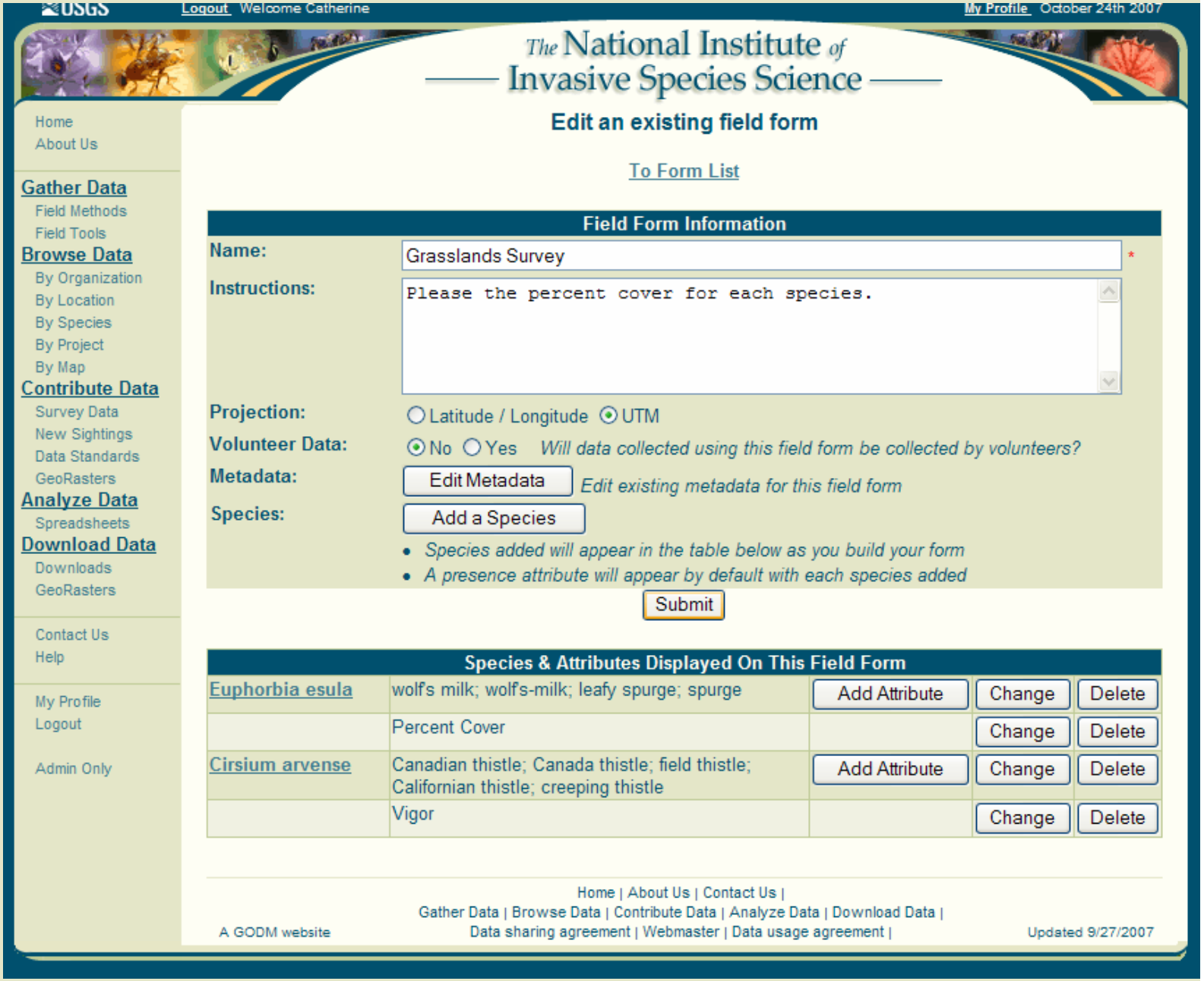
Project Manger Online Data Entry Form Creation

- Create a form
- View print version
- Collect data



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Customized Online Data Entry Form

Previewing Grasslands Survey

To Form List

Please the percent cover for each species.

Enter the date of the observation

Date:	October	24th	2007
Notes:			

Enter the location information

Datum:	WGS_84
Zone:	-- Select --
Easting[1]:	
Northing[2]:	
Accuracy[3] (meters):	

Field Form

Euphorbia esula (wolf's milk; wolf's-milk; leafy spurge; spurge)	
Percent Cover	
Cirsium arvense (Canadian thistle; Canada thistle; field thistle; Californian thistle; creeping thistle)	
Vigor	Dead

[1] X coordinate; data must be between approximately 100,000 and 900,000 meters (Example: xxxxxx.x)

[2] Y coordinate; data must be between approximately 0 and 9,328,000 meters. (Example: xxxxxxx.x)

[3] Approximate accuracy of your GPS unit in meters. We only accept data below 10 meteres in accuracy

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Customized PDA tools

- Create a form on-line
- Download program to PDA
- Collect data
- Connect to website and automatically upload data

1)

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Customized PDA tools

- Create a form on-line
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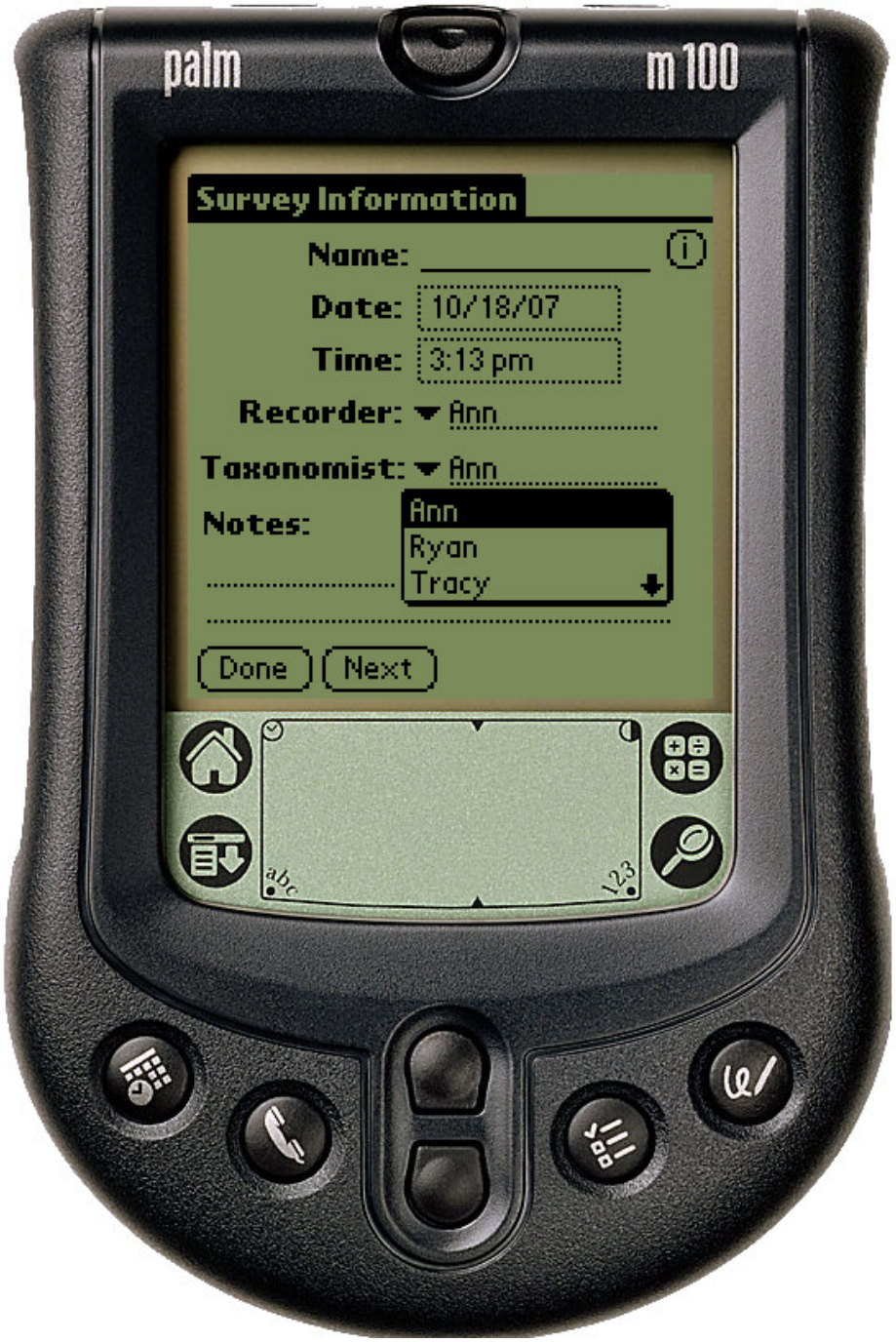
2)



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Customized PDA tools

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3)

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Customized PDA tools

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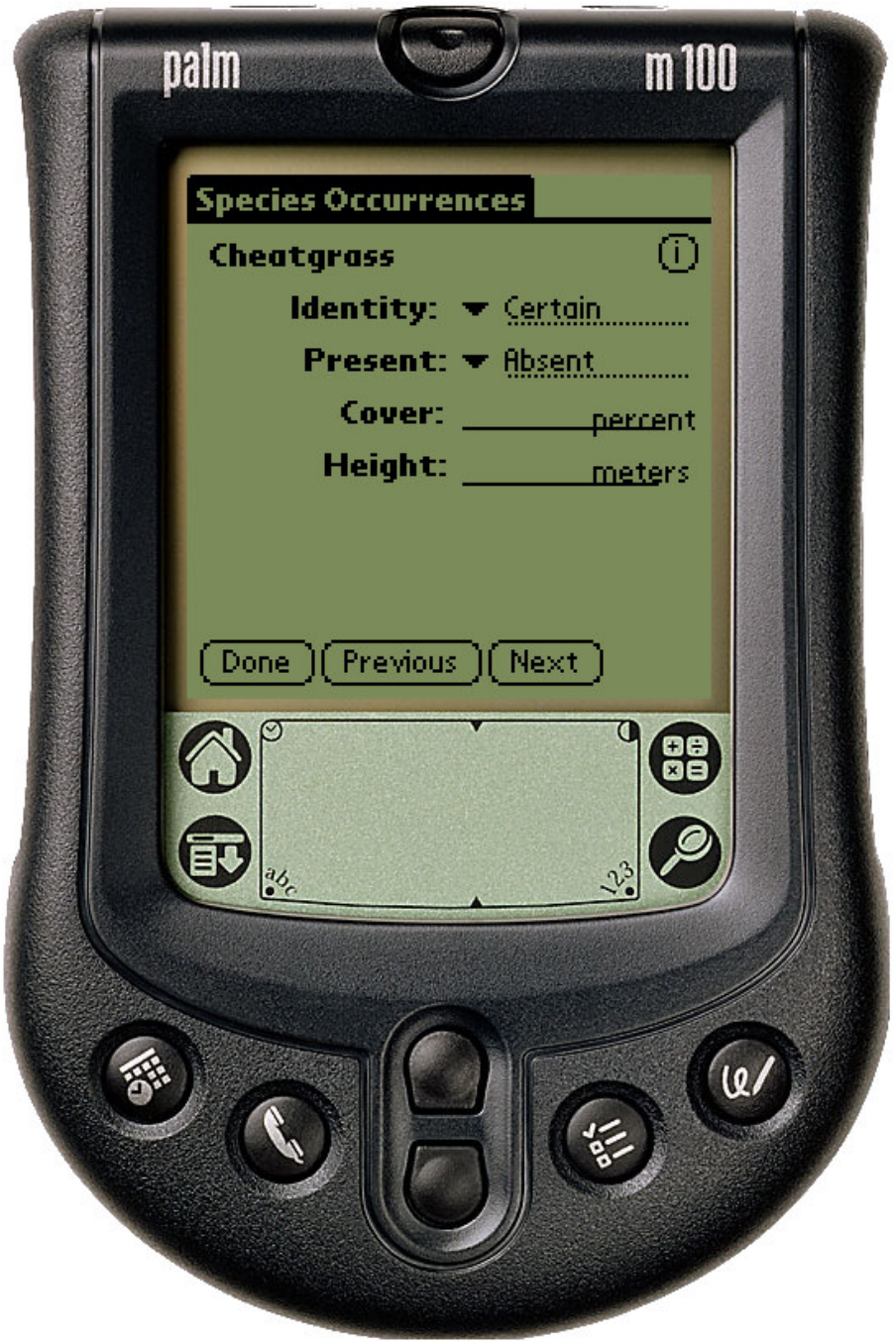
4)



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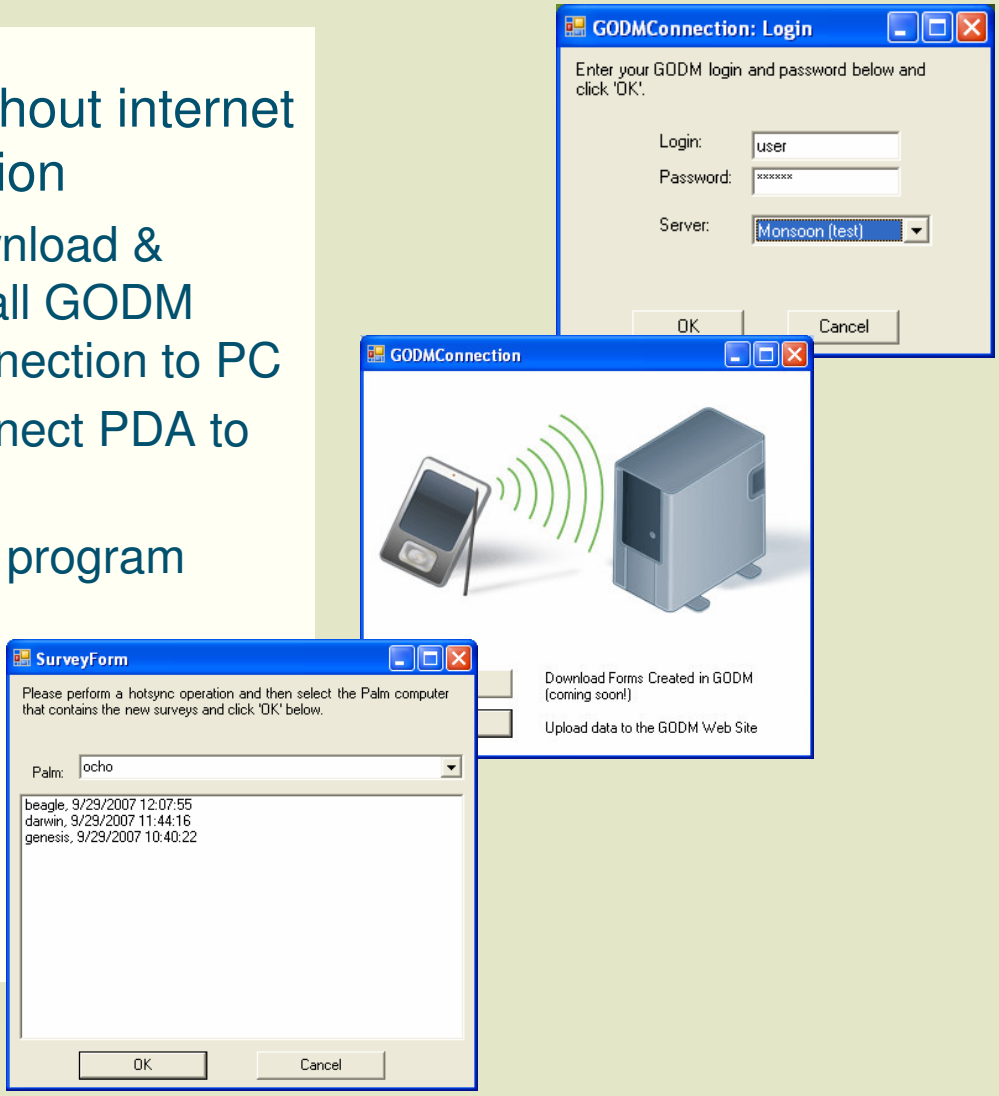
Customized PDA tools

PDA with internet connection

- Connect to website
- Automatically upload data

PDA without internet connection

- Download & Install GODM Connection to PC
- Connect PDA to PC
- Run program



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- Watch lists
- Prioritize species
  - Spread
  - Dominance
- Priority locations
- Etc.

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Acknowledgements:

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For more information contact:

jarnevichc@usgs.gov
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