



# Aquatic Weed Control Using ArcPad, ArcGIS, ArcSDE and ArcIMS

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*Dorenne Smith – CA Dept. of Boating &  
Waterways*

*John Jarnagin – VESTRA Resources Inc.*

# Aquatic Weed Control Program

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- Targeted aquatic weeds – non native species: Egeria Densa, Water Hyacinth
- Method of control - weeds are physically removed or sprayed with herbicide



# CA Dept. of Boating and Waterways

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- Lead agency for controlling aquatic weeds in the Sacramento – San Joaquin delta area
- 368 sites in the Delta



# Why Control the Weeds?

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Non-native aquatic weed species:

- Crowd out native vegetation
- Affect dissolved oxygen levels of the water
- Clog agricultural water intakes
- Negatively impact pumping of water from water rich northern CA to the arid southern parts of the state
- Clog waterways and interfere with recreational pursuits

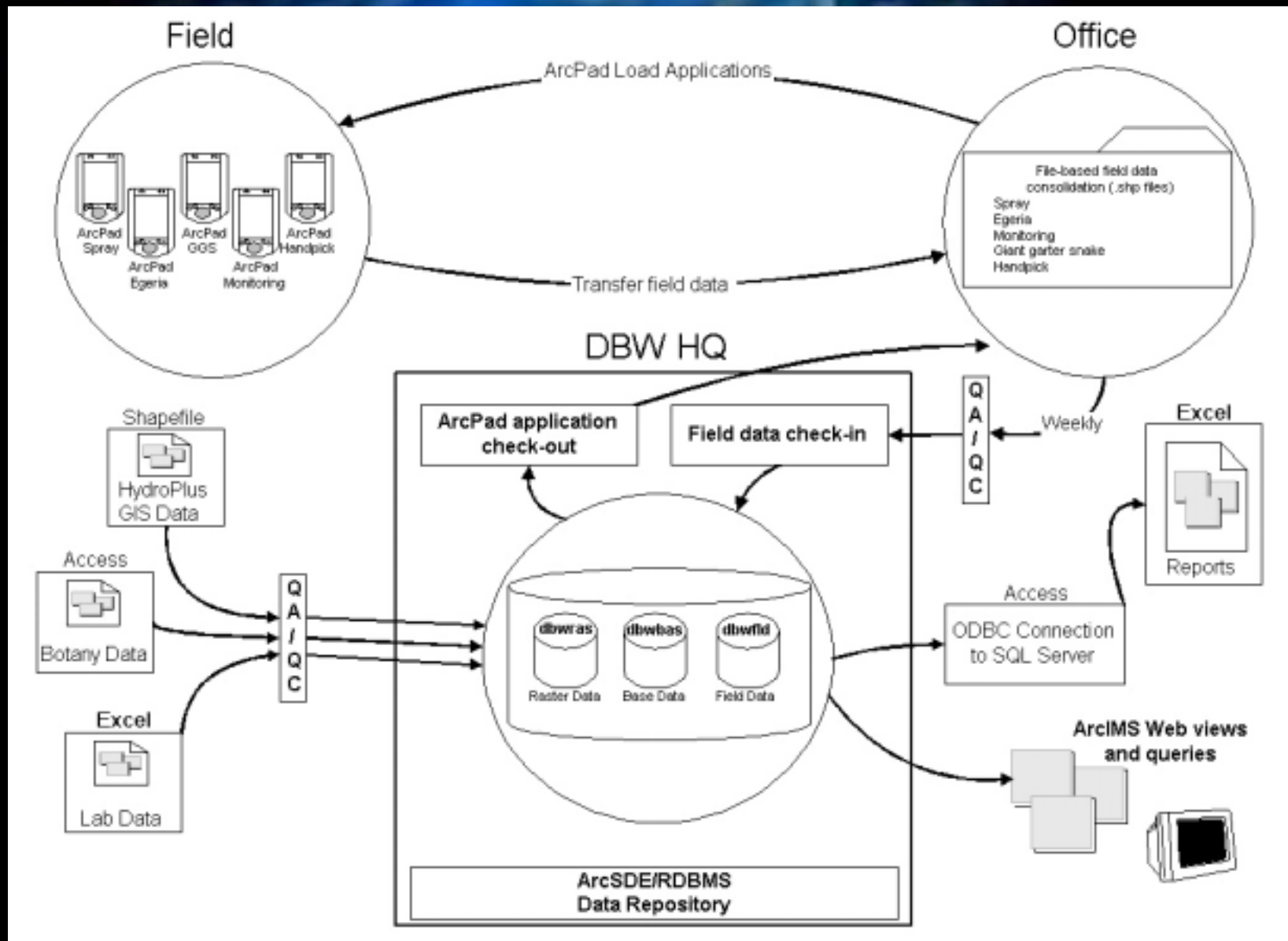


# Database Design

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- 'dbwfld' – Field Data. Data gathered in the field that are specific only to the Aquatic Weeds Program.
- 'dbwras' – Raster Data.
- 'dbwbas' – Base Data. This includes other datasets that are often used as background layers for map production, such as county boundaries and hydrology layers.

# Data Flow



# Office

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- Data and custom ArcPad template are loaded onto all hardware

# Environmental Monitoring

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- Water is monitored before and after herbicide application including, water temperature and dissolved oxygen levels
- Water samples are collected for testing in a lab
- Data are output into quarterly and yearly reports for CA Water Control Board and other involved government agencies





# Out in the Field

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ArcPad forms are filled out, while in the field:

- Location of where boat was loaded
- Location of water samples taken and other environmental monitoring occurred
- GPS position of where herbicides were applied
- Location where boat was loaded, unloaded
- Observations of species of concern



# Customizing ArcPad

ArcPad forms were customized to:

- Enforce data integrity
- Sum chemical usage
- Autopopulate required ID fields
- Enforce “Business Process”

The image shows two overlapping ArcPad forms. The top form is titled 'Load Boat' and has two pages. Page 1 contains three fields: 'BOATID' with a dropdown menu showing '2938xs', 'SPRAYDATE' with a date picker showing '06/17/200', and 'WEED' with a dropdown menu showing 'Water hyacint'. The bottom form is titled 'Spray Line' and has two pages. Page 1 contains five fields: 'BOATID' with a dropdown menu showing '2938xs', 'SPRAYDATE' with a date picker showing '06/17/200', 'SITEID' with a text box containing '667', 'COUNTY' with a dropdown menu showing 'Sacramento', and 'WEED' with a dropdown menu showing 'Water hyacint'. Both forms have 'OK' and 'Cancel' buttons at the bottom.

# Business Process

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- Load the Boat
- Begin Spraying
- Add Sprayline – apply herbicide
- End Spray
- Unload the Boat
- Species of Concern - Observations



# Custom ArcPad Toolbar

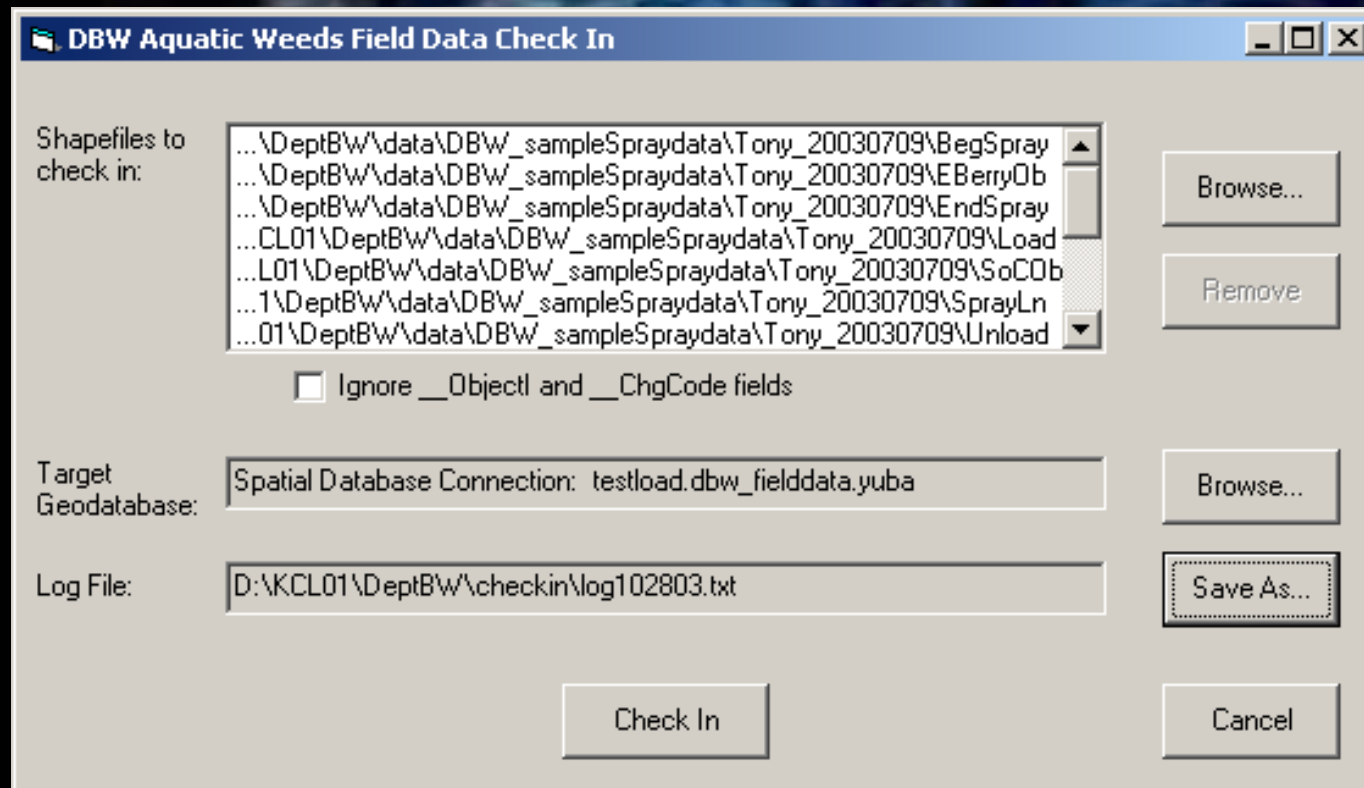
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- Activate the template by clicking the pencil icon
- Can exit template by clicking red icon
  - No functionality will occur outside the template (auto populating fields, summing of chemicals used, etc.)
- Can go back into template by clicking the green icon
- Can fill out Species of Concern forms at any time after the boat is loaded
- Template enforces DBW Business Process



# Data Check-in

- Field data are first checked for quality assurance then loaded into the geodatabase using a custom bulk check-in tool



# Other data

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- Water quality data are collected using multi-parameter water quality instrumentation in shapefile format
- Botany data are collected and entered into an Access database
- Lab data – water samples are collected in the field and analyzed in a lab
- These data are checked for quality assurance and then loaded into the data repository

# Data Extraction Tool–Report Generation

- Once loaded into the repository, data are extracted out of the geodatabase for use in monthly, quarterly and annual reports using a custom data extraction tool
- Built using Microsoft Access queries, forms
- Flexibility – new queries can be built as needed

The screenshot shows the 'DBW Aquatic Weed Program - Data Extraction' window. It features a 'Report Date Range' section with 'From' and 'To' date pickers set to 1/1/2003 and 11/11/2003, and a 'Change Dates' button. Below this are two columns of data categories: 'Daily Crew Data' with a checked checkbox for 'Application Data Sorted by Month', and 'Botany Surveys' with a checked checkbox for 'Botanical Site Inventories'. The 'Monitoring/ Lab Data' column has four unchecked checkboxes: 'Chemical Residue Results', 'Biotoxicology Results', 'Hydrology Data - Monitoring', and 'Water Quality Characteristics'. At the bottom, there is a 'Target Excel File' text box with a 'Browse...' button, and 'Extract Data' and 'Close' buttons.

The screenshot shows the 'Report Date' dialog box. It prompts the user to 'Enter Reporting Date Range:' with 'From' and 'To' date pickers set to 7/1/2003 and 7/31/2003. At the bottom, there are 'Start Reporting' and 'Cancel' buttons.

# ArcIMS - Intranet

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Using ArcIMS, DBW staff can:

- Access GIS related maps, data
- Print maps specific to site, chemical applied, crew member involved, etc.
- Get information for meetings, public questions



# ArcIMS - Intranet

Aquatic Weed Program Test Viewer - Microsoft Internet Explorer

Address: http://10.1.1.15/webste/awp\_test/viewer.htm

### Aquatic Weed Program Test Viewer

**Layers**

- Visible Active
- AWP - Spray Lines (2003)
- AWP - WQ Monitoring (2003)
- AWP - Sides
- Large Cities
- Large Rivers
- Lakes
- Counties
- SPOT Ortho
- CA Hillshade

Refresh Map

Map created by OWA Intranet Technology

**AWP - WQ Monitoring (2003)**

Rec	DBWF.LD.GIS.HPGIS_DATA_A.OBJECTID	DBWF.LD.GIS.HPGIS_DATA_A.SAMPLEID	DBWF.LD.GIS.HPGIS_DATA_A.SITEID	DBWF.LD.GIS.HPGIS_DATA_A.SAM
1	296	H823-890403-2	023	CG/SF
2	297	H823-890403-2	023	CG/SF

Zoom In

Map: -128876.47, 7592.92 - Image: 200, 224 - ScaleFactor: 17.5209741825503

Internet



***Dorenne Smith***

*GIS Analyst*

*CA Dept. of Boating & Waterways*

*[dsmith@dbw.ca.gov](mailto:dsmith@dbw.ca.gov)*

*916.263.6703*

**VESTRA**



***John Jarnagin***

*GIS Analyst/Project Manager*

*VESTRA Resources Inc.*

*[johnj@vestra.com](mailto:johnj@vestra.com)*

*530.223.2585*