

# Electronic Field Forms in the National Aquatic Resource Surveys

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# Background

- National Aquatic Resource Surveys - a series of statistical surveys on the condition of our nation's waters
  - Coastal
  - Lakes
  - Rivers & Streams
  - Wetlands

# Background

- **Stats for the National Lakes Assessment (NLA) 2012:**
  - 1275 sites
  - 82 field crews
  - 20 forms

# History

- Predominantly Paper Field Forms
- Selected use of Fillable PDFs:
  - Tracking/shipping forms
  - Equipment Request forms

The image shows three overlapping forms from the MLA 2012 system. The top-left form is 'MLA 2012 NEED SAMPLE COLLECTION (Page 1 of 3)', which includes sections for 'SCIENCE TRANSPARENCY', 'COUNTRY CODE', 'ALMA TOWN (Monterey) (MCA)', 'TRAINER PRICER SCREEN (TRG)', 'INSTRUMENT DATA', 'PERFORMER/STAFF', and 'CHILDREN & ADULTS'. The top-right form is 'MLA 2012 REQUESTION', which includes fields for 'SITE NAME', 'DATE OF VISIT', 'TYPE OF VISIT', and 'DO YOU SAMPLE THIS SITE?'. The bottom-right form is 'MLA 2012 TRACKING - DIVIDED SAMPLES', which features a table with columns for 'Sample ID', 'Sample Type', and 'Status', and a 'STATUS' section at the bottom.

The image shows the 'NLA 2012 REQUEST FORM'. It includes fields for 'DATE OF REQUEST' (04/15/2012), 'REQUESTER NAME', 'CREW', 'INFLUATION', 'PHONE', 'EMAIL', 'ADDRESS', 'CITY', 'STATE', and 'ZIP'. Below these is a 'SUPPLIER REQUEST' section with checkboxes for 'BASE FORMS', 'SAMPLE LABELS', and 'FIELD SUPPLIES', each with sub-options for 'FULL PACKET', 'SPECIFIC FORMS', 'FULL SITE SHEET', 'PRINTING EXTRA JARNS', 'PRINTING BLANK', 'FULL SITE KIT', 'CARBONKIT', and 'SPECIFIC SUPPLIES'. At the bottom, there is a 'FOR IM USE' section with fields for 'FORWARDED TO', 'DATE', 'RESOLUTION', and 'DATE RESOLVED'. The form number '5401428100' is visible in the bottom right corner.

# Problems

- Processing paper field forms takes a significant amount of time and money
  - Scanning
  - Quality Control
  - Clean Up
- Delays data analysis



# New Options to Consider

- New technology: tablets, phones and computers
- Various development platforms
- Various devices

# Still Problems

- Vast array of different equipment desires
- Can not require use of electronic field forms by field crews



# Results

- Development of a NARS App
  - 3 platforms:
    - Windows (not windows mobile)
    - Android
    - Apple



# Structure

- Forms for each of the data sheets
- “Form of Forms”
- Submission of forms separately
- Status form is pulled from other forms

# Features

- In field validation
- Near real-time response to submissions
- Integrated sample tracking
- Direct database connection

# Distribution

- Sharefile (Android & Windows)
- iTunes (Apple) – still working this out
  - Enterprise agreement, UDID



Name	Size	Type
db_ML2012_JL2	27 KB	DB3 File
<u>NARS_windowsApp.exe</u>	3,796 KB	Application
NARS_windowsApp.pdb	660 KB	PDB File
NARS_windowsApp.xml	1 KB	XML Document
System.Data.SQLite.dll	884 KB	Application Extension

# Home Page - Windows

Welcome to the NARS Windows App!

To begin, input a new site ID and visit number or select one of the previously entered site id and visit number combinations to review:

**New Site:**

Site ID:  Visit No:

**Previous Site:**

Site ID:  Visit No:

*N. A. R. S.*

# Home Page - Android/Apple

The screenshot shows a mobile application interface for site management. At the top, the status bar displays 'Carrier', signal strength, '10:18 AM', and '100%' battery. Below the status bar, the URL '.itb\_NLA2012.sgte' is visible. The main heading is 'Choose to start a new site or review existing site:'. There are two main sections: 'New Site' and 'Previous Site'. The 'New Site' section is highlighted with a red border and contains a checked checkbox, a 'Site ID' field with 'NLA12-' entered, a 'Visit' field with '1' entered, and a 'Begin...' button. The 'Previous Site' section is highlighted with a blue border and contains an unchecked checkbox, a 'Site ID' dropdown menu, a 'Visit' dropdown menu, and a 'Review...' button.

Carrier 10:18 AM 100%

.itb\_NLA2012.sgte

Choose to start a new site or review existing site:

New Site:

Site ID: Visit:

NLA12- 1

Begin...

Previous Site:

Site ID: Visit:

Review...

# Site Verification

**NLA 2012 VERIFICATION** Reviewed by (Initial):

Site ID:  Visit:  1  2 Date:  /  /

Site Name:  Mode of Access:  Vehicle  Hike-In  Aircraft Field Crew:

**LAKE VERIFICATION INFORMATION**

Lake shape compares with map?  YES  NO Is there public access?  Yes  No Access Description:

Lake verified by (Mark all that apply):  GPS  Local Contact  Signs  Roads  Topo. Map  Other (Describe Here):

Not Verified (Explain in Comments)

Type of GPS Fix:  2D  3D

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**NLA 2012 VERIFICATION** Reviewed by (Initial):

Site ID:  Visit:  1  2 Date:  /  /

Site Name:  Mode of Access:  Vehicle  Hike-In  Aircraft Field Crew:

**LAKE VERIFICATION INFORMATION**

Lake shape compares with map?  YES  NO Is there public access?  Yes  No Access Description:

Lake verified by (Mark all that apply):  GPS  Local Contact  Signs  Roads  Topo. Map  Other (Describe Here):

Not Verified (Explain in Comments)

Type of GPS Fix:  2D  3D

**MAP** Coordinates Latitude Longitude Type of GPS Fix:  2D  3D

**LAUNCH SITE** Coordinates Latitude Longitude Type of GPS Fix:  2D  3D

If these are not actual launch site coordinates, explain below:

DID YOU SAMPLE THIS SITE?  YES  NO  
if NO, mark one reason and explain below:  Not Visited  Non-target  Inaccessible  Other(Explain below):

**GENERAL COMMENTS**

**DIRECTIONS TO LAKE & LAUNCH SITE (from nearest main road or town):**

**LAUNCH SITE DESCRIPTION**

**PERSONNEL**

Name:  Leader:  Name:

03/21/2012 NLA Verification 036660501

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**Site Verification** Profile Index Samp Shoreline Samp Pha

**Site Parameters >>**

**Map Parameters >>**

**Visit Parameters >>**

**Review and Save >>**

**NLA SITE VERIFICATION I**

Site name:

Date:  Cre

Mode of access:  Vehicle  Hik

Site ID:  Visit number:

# Site Verification

**Site Verification** Profile Index Samp Shoreline Samp Pha

Site Parameters >>  
Map Parameters >>  
Visit Parameters >>  
Review and Save >>

Lake shape compares with map:  Yes

Is there public access?  Yes

Access description: County Pa

Lake verified by (check all that apply):

- GPS
- Local Contact
- Roads
- Topo Map
- Not verified (explain in comment)

If "Other" is selected, please describe:

Coordinates	Latitude (North)	Longitude
MAP	<input type="text"/>	<input type="text"/>
LAUNCH SITE	<input type="text"/>	<input type="text"/>

Site ID: NLA12-NWQMCtest1 Visit number: 1

**NLA 2012 VERIFICATION** (Printed by User: )

Site ID: NLA2012- Visit: 0 1 0 2 Date: 2 0 1 2

Site Name: Mode of Access:  Vehicle  Hike-In  Aircraft Field Crew:

Lake shape compares with map?  YES  NO Is there public access?  Yes  No Access Description:

Lake verified by (Mark all that apply):  GPS  Local Contact  Signs  Roads  Topo Map

Other (Describe Here):  Not Verified (Explain in Comments)

Coordinates	Latitude	Longitude	Type of GPS Fix
MAP	Decimal Degree NAD 83		
LAUNCH SITE	Decimal Degree NAD 83		<input type="radio"/> 2D <input type="radio"/> 3D

If these are not actual launch site coordinates, explain below:

DID YOU SAMPLE THIS SITE?  YES  NO  
If NO, mark one reason and explain below:  Not Visited  Non-target  Inaccessible  Other (Explain below):

GENERAL COMMENTS

DIRECTIONS TO LAKE & LAUNCH SITE (from nearest main road or town):

LAUNCH SITE DESCRIPTION

PERSONNEL

Name	Name
Leader:	

03/27/2012 NLA Verification 036660501

# Site Verification

The image shows a mobile application interface for site verification. On the left, a menu is visible with four options: "Site Parameters >>", "Map Parameters >>", "Visit Parameters >>", and "Review and Save >>". The "Visit Parameters >>" option is highlighted with a purple box. The main screen displays a "SAMPLE" form with the following sections:

- Did you sample this site:** Radio buttons for "Yes" (selected) and "No".
- If "No", select one reason below and provide explanation:** Radio buttons for "Not Visited", "Inaccessible", and "Other".
- Explanation if lake not sampled:** A large text input area.
- General Comments:** A text input area.

At the bottom of the screen, the "Site ID" is "NLA12-NWQMCtest1" and the "Visit number" is "1".

On the right, a detailed form titled "NLA 2012 VERIFICATION" is shown, which includes the following sections:

- Site ID:** NLA2012- (with a dropdown arrow)
- Visit:** Radio buttons for "1" (selected) and "2".
- Date:** 2012
- Site Name:** (with a dropdown arrow)
- Mode of Access:** Radio buttons for "Vehicle", "Hike-In", and "Aircraft".
- LAKE VERIFICATION INFORMATION:** Includes "Lake shape compares with map?" (radio buttons for "YES" and "NO") and "Is there public access?" (radio buttons for "Yes" and "No").
- Lake verified by (Mark all that apply):** Radio buttons for "GPS", "Local Contact", "Signs", "Roads", and "Topo. Map".
- Coordinates:** Fields for "Latitude" and "Longitude".
- MAP:** Fields for "Decimal Degree NAD 83" and "Type of GPS Fix" (radio buttons for "2D" and "3D").
- LAUNCH SITE:** Fields for "Decimal Degree NAD 83" and "Type of GPS Fix" (radio buttons for "2D" and "3D").
- GENERAL COMMENTS:** A text input area.
- DIRECTIONS TO LAKE & LAUNCH SITE (from nearest main road or town):** A text input area.
- LAUNCH SITE DESCRIPTION:** A text input area.
- PERSONNEL:** Fields for "Name" and "Leader".

A large diagonal watermark "NOT FOR USE IN FIELD" is overlaid on the right form.

# Site Verification - Android

Carrier 10:21 AM 100%

Site ID:  
NLA12-0123

State:  
Oregon

Site Name:  
Sprout Lake

Site Code:  
1

Site Address:  
Hike-In ▼

Site Category:  
Mar 22, 2012 ▼

Update Cancel

# Tabs

The image shows a web application interface with a tabbed menu at the top. The tabs are: < Site Verification Profile Index Samp Shoreline Samp Pha >. The 'Site Verification' tab is selected and highlighted. Below the tabs is a sidebar with four menu items: Site Parameters >>, Map Parameters >>, Visit Parameters >>, and Review and Save >>. The main content area is titled 'NLA SITE VERIFICATION FORM' and contains the following fields:

- Site name:
- Date:
- Crew:
- Mode of access:  Vehicle  Hike-In  Aircraft

At the bottom of the form, there are three fields: Site ID: , Visit number: , and a button labeled Form of Forms.

# Saving Data - Windows

The screenshot shows a mobile application interface for saving site data. The interface is divided into several sections:

- Navigation Bar:** Contains tabs for "Site Verification", "Profile", "Index Samp", "Shoreline Samp", and "Pha".
- Left Panel:** A list of options: "Site Parameters >>", "Map Parameters >>", "Visit Parameters >>", and "Review and Save >>". The "Review and Save >>" option is highlighted with a red rectangular box.
- Main Content Area:**
  - SITE PARAMETERS:** Includes fields for "Date: 5/1/2012", "Site name: Hoghead Creek", "Crew: HQ1", and "Mode of access: VEHICLE".
  - MAP PARAMETERS:** Includes fields for "Lake shape: Y", "Land ownership: YES", "Public type: County Park boat ramp", "Verified by GPS: Y", "Verified by local contact: Y", "Verified by signs: Y", "Verified by roads: Y", and "Verified by topographic map: Y".
- Bottom Section:** A "Save" button is highlighted with a yellow oval.
- Footer:** Contains "Site ID: NLA12-NWQMCtest", "Visit number: 1", and "Form of Forms".

# Saving Data - Android/Apple

Carrier 10:22 AM 100%

**SITE PARAMETERS**

Site ID: NLA12-0123  
Site Name: Sprout Lake  
Crew: Oregon  
VISE: 1  
Mode of Access: Hike-in  
Date Collected: Mar 22, 2012

**MAP PARAMETERS**

Lake shape like map: YES  
Is there public access: YES  
Access description: Long hike  
Verified by GPS: Y  
Verified by local contact:  
Verified by signs:  
Verified by roads:  
Verified by topo map: Y  
Verified by other:  
Other description:  
Not verified:  
Map lat/long: 45 / 124  
Launch lat/long: 45 / 124  
Launch site comments:  
Directions:  
Launch Descript: Rocky launch

**VISIT PARAMETERS**

Site sampled: Yes  
Reason no samp.:  
Explain no samp.:  
General Comments:  
Leader: Tad Larsen

Save Cancel

# Submitting Data - Windows

The screenshot shows a web-based data entry interface. At the top, there is a navigation bar with tabs: '< Site Verification Profile Index Samp Shoreline Samp Pha >'. The 'Site Verification' tab is active. On the left side, there is a vertical menu with four items: 'Site Parameters >>', 'Map Parameters >>', 'Visit Parameters >>', and 'Review and Save >>'. The 'Review and Save' item is highlighted. The main content area is titled 'SITE PARAMETERS' and contains the following text: 'Date: 5/1/2012', 'Site name: Hoghead Creek', 'Crew: HQ1', and 'Mode of access: VEHICLE'. Below this is a section titled 'MAP PARAMETERS' with the following text: 'Lake shape: Y', 'Land ownership: YES', 'Public type: County Park boat ramp', 'Verified by GPS: Y', 'Verified by local contact: Y', 'Verified by signs: Y', 'Verified by roads: Y', and 'Verified by topographic map: Y'. At the bottom of the main content area is a 'Save' button. At the very bottom of the window, there is a footer area with 'Site ID: NLA12-NWQMctest1', 'Visit number: 1', and a button labeled 'Form of Forms' which is circled in yellow.

<	Site Verification	Profile	Index Samp	Shoreline Samp	Pha	>
Site Parameters >>	<b>SITE PARAMETERS</b> Date: 5/1/2012 Site name: Hoghead Creek Crew: HQ1 Mode of access: VEHICLE					
Map Parameters >>	<b>MAP PARAMETERS</b> Lake shape: Y Land ownership: YES Public type: County Park boat ramp Verified by GPS: Y Verified by local contact: Y Verified by signs: Y Verified by roads: Y Verified by topographic map: Y					
Visit Parameters >>	<input type="button" value="Save"/>					
Review and Save >>	Site ID: NLA12-NWQMctest1	Visit number: 1	<input type="button" value="Form of Forms"/>			

# Submitting Data - Android/Apple

The screenshot shows a mobile application interface on an iPhone. The status bar at the top displays 'Carrier', signal strength, '10:36 AM', and '100%' battery. The app title is 'Form of Forms'. The form contains the following fields:

- Site ID:
- Site Visit:
- Site Ver:
- Reviewed by:
- Profile:
- Reviewed by:
- Index Samp:
- Reviewed by:
- Shore Samp:
- Reviewed by:
- Phab:
- Reviewed by:
- Invasive:

At the bottom of the screen, there is a navigation bar with the following items: Site Ver/Code, Profile, Index Samples, Shoreline Samples, Field Observations, Invasive Species, Lake Assessment, and More.

# Response

- Auto response email
  - Indicates data was received
- 2<sup>nd</sup> response email
  - Flags any quality concerns with data (on a general scale)
- At any point you may resubmit data
  - Latest copy will go into the database but previous information will not be lost



# Resubmitting Data - Windows

Welcome to the NARS Windows App!

To begin, input a new site ID and visit number or select one of the previously entered site id and visit number combinations to review:

**New Site:**

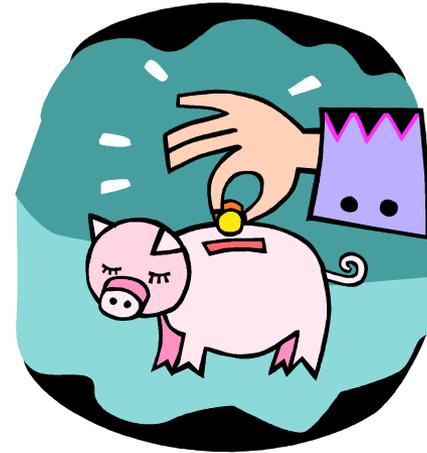
Site ID:  Visit No:

**Previous Site:**

Site ID:  Visit No:

# Anticipated Benefits

- Cost Savings:
  - Rite on Rain paper
  - Personnel costs (scanning, QA)
- Reduced data turn-around time



# Anticipated Participation

- Much excitement on the development of the NARS App
  - 10-15 field crews will be using this summer

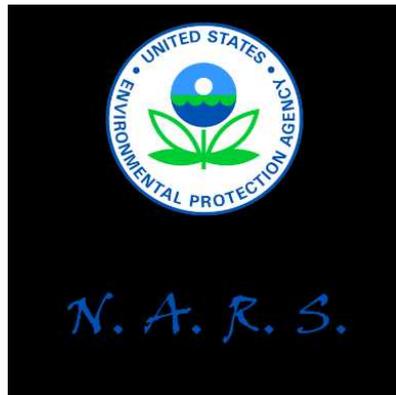


# Anticipated Future Features

- Use of device abilities:
  - integrated GPS
  - photos
  - voice recognition for text fields
- Additional field validation

# Questions?

- Marsha Landis, U.S. EPA, [landis.marsha@epa.gov](mailto:landis.marsha@epa.gov)
- Sarah Lehmann, U.S. EPA, [lehmann.sarah@epa.gov](mailto:lehmann.sarah@epa.gov)
- Marlys Cappaert, SRA International Inc., [cappaert.marlys@epa.gov](mailto:cappaert.marlys@epa.gov)



The App is also available for testing at the EPA booth.