

A Cost Benefit Analysis of Electronic Field Data Capture for Stream Surveys in Idaho

DATA CAPTURE IN THE FIELD USING PORTABLE HAND HELD DEVICES



A Pilot Study by IDFG,
PSMFC, and BPA

Goal: Compare electronic field data collection with the traditional collection of data on paper.

Paper

VS

Tablet

IDFG - Steelhead Monitoring Snorkel Survey

Stream Boulder Creek Strata -99 Site / Design No. 39625
 Survey Date 8-2-2014 Time (military) 1413 Data Crew RE, MR, MB, JS
 Program: SMES GPM - Sild Parr Resight Drainage LCUSA # Snorkelers 4
 Coordinates: Lat / Long 46.61803 N 114.68190 W GPS elevation 4592 (ft)
 Water Temp 14.5 (c) Visibility 4.2 (m) Weather Sunny Channel Type B
 Photos Taken: Yes - No Comments TEND LOGGER or snorkel left in site
 Percent Habitat Type: Pocket Water 20 Pool 40 Riffle 40 Run Glide
 Total Length 102.9 (m) Widths 10.3 10.2 10.4 8.7 9.5 10.9 (m)
 live mussels present empty shells present species size: <2" 2-5" >5" abundance: low med high

Length Class (ft)	Steelhead / Rainbow Trout	Cutthroat	Bull Trout	Brook Trout	Mountain Whitefish
<2 (ft)	* • ①				
2	: ②	** ②			
3	:: ④	II ⑦			
4	::: ⑤ ① 4' cutbow	:: ③			
5	** ②		* ①		
6	:: ③	::: ④			
7	::: ③	* ①			
8					
9					
10	* ①				
11					
12		* ①			
13					
14					
15					
>15 specify					
Chinook Zarc			Chinook Age One		
Chinook Adults			Amphibians Present	Tailed Frog	

* GPS Point ~ 300 ft on hillside site START at data sheet coordinates
 -SCLPN

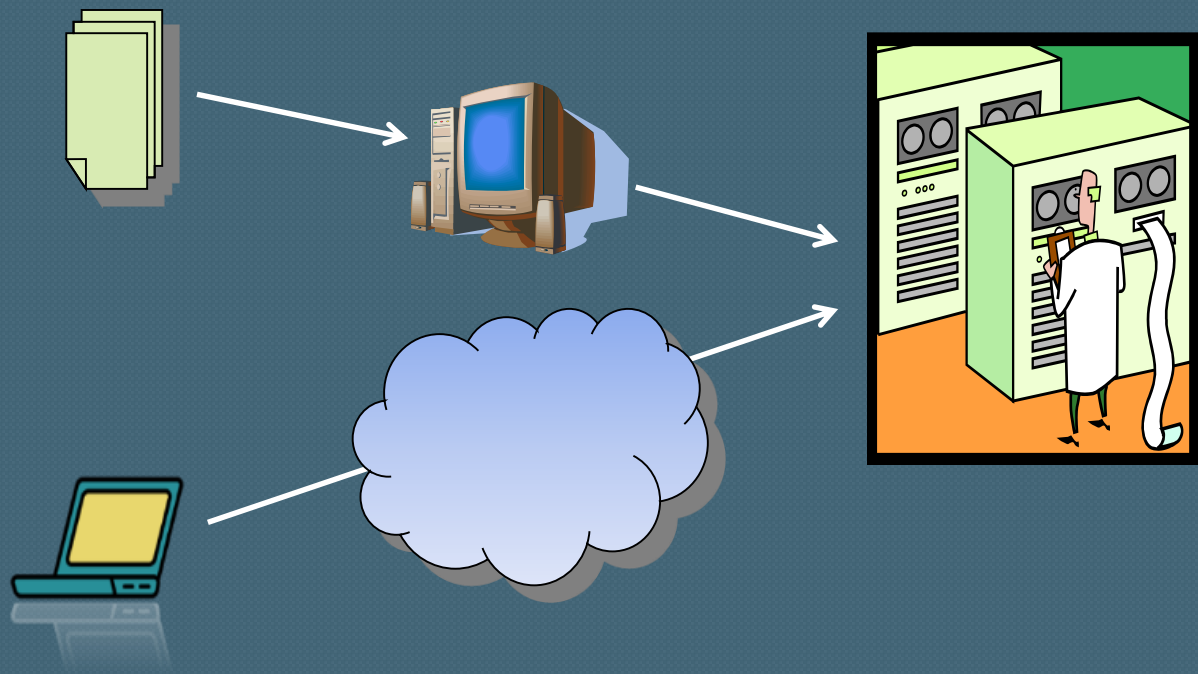


How it's always been done...



The Idea

- Save time in the office
- Reduce errors, only enter data once
- Data collection, data entry at the same time



Things to Consider



- Costs \$\$\$\$ and
- Accuracy and speed of data input
- Limiting factors of this study
- Feasibility of hardware in field conditions
- Feasibility of software in field conditions

Two tablets evaluated

APPLE IPAD 4

- Blue Tooth
- Wi-Fi
- External GPS
- Internal Camera
- Ruggedized
- Shoulder Strap
- Hand Strap
- No Back Up Drive



PANASONIC TOUGHPAD FZ-A1

- Blue Tooth
- Wi-Fi
- Internal GPS
- Internal Camera
- Ruggedized
- No Straps
- SD Card Back Up Drive



Web Application Software Evaluated

Fulcrum:

Application development software


Create data entry forms

Synch tablet data with cloud data



iPad

2:06 PM

14% 

Cancel

Fish

Done

Species

Salmonid Fry (Oncorhynchus var. sp.)

*

Origin

Wild or Natural

*

Number of fish

6

*

Size class (inches)

Comments

Delete / Ignore

No

*

Technology in The Field



Initial Concerns

At first we felt like: No way!



- Extreme field conditions
- Real time functionality
- Data loss
- Battery life

In the Field

- Training: 2 days
- Dual entry of data
- Entry form not fast enough
- Re-worked field strategy

Feasibility in the Field

○ Hardware:

- Survived bashes & splashes
- Easy to learn
- High temperatures affect iPad
- Battery life sufficient
- Freeze ups → data loss
- iPad preferred

Feasibility in the Field

○ Software

- Learning curve, practice, pre-fill survey info
- Forms, Picklists too slow for most snorkel surveys
- Update Data Forms Per Feedback
 - Synch with developers first chance in field

Real time data entry *and* post survey

- Real time when possible
- Post survey when not possible
- Faster, better data?



Seasons End

we were *flying*
through the
process



Post Field Season

- Data extracted from Fulcrum website
- Transformed to Stream Survey database schema
- Loaded into SQL Stream Survey database
- QAQC in SQL and GIS



Conclusions Season One

- Need faster custom data entry grid for fish data
- Need data back up
 - Automagically during survey
 - External /bluetooth or internal/removable
- Greater operating range

Season Two

- Custom web app
- Faster fish data entry
- QAQC Summary
- Fewer picklists



Custom Web Application

- ◉ Programming
- ◉ Time to develop
- ◉ Development steps
- ◉ Approximate cost
- ◉ Alternatives

Dynamic Fish Grid

fishandgame.idaho.gov/ifwis/SnorkelSurvey/index.html

<< Num Pad Species Width Clams Undo To Survey >>

Rainbow / Redband Trout (Wild) <7: +1

Species	Total	<2	2	3	4	5	6	7	8	9
Westslope Cutthroat Trout	6	1				5				
Rainbow / Redband Trout (Wild)	5		1					4		
Redside Shiner	P									
Longnose Dace	5									

<< Set Marked Fish Over Sample Under Sample >>

Simplified Pick Lists

fishandgame.idaho.gov/ifwis/SnorkelSurvey/index.html

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Add New Site **Return to Survey**

Filter: Parent Name Filter: HUC4 (drainage)

None None

Site Type [Select Site Type](#)

Stream	Stratum	Site/Number	PName	HUC4
Alturas Lake Creek	2	2B	Salmon River	Upper Salmon
American River	3	2	South Fork Clearwater River	South Fork Clearwa
American River	2	1	South Fork Clearwater River	South Fork Clearwa
Anderson Creek	-99	529375	Dahlonge Creek	Middle Salmon-Pan
Anderson Creek	-99	488415	Dahlonge Creek	Middle Salmon-Pan
Anderson Creek	-99	472031	Dahlonge Creek	Middle Salmon-Pan
Anderson Creek	-99	332767	Dahlonge Creek	Middle Salmon-Pan
Anderson Creek	-99	324575	Dahlonge Creek	Middle Salmon-Pan
Anderson Creek	-99	136159	Dahlonge Creek	Middle Salmon-Pan

Summary for QAQC

fishandgame.idaho.gov/ifi x

fishandgame.idaho.gov/ifiwis/SnorkelSurvey/index.html

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Summary

[Return To Survey](#)

Survey

Good: 16
Maybe Good: 1
Needs Work: 8

SectionID: 1101
Stream: American River
Stratum: 2
Section: 1
Latitude:
Longitude:
Altitude:
Site Description
Project Leader: Copeland; Timothy
Crew: -None-
Survey Date: 11/11/2015
Start Time: 1400
End Time: 1530
Water Temp: 13
Visibility: 2
#Snorkelers: 5
Weather: Fog
Pictures Taken Absent
ChannelType: -None-
Length Absent
% Pool: Unknown
% Riffle: Unknown
% Run: Unknown

Hydrology

Survey Length: Unknown
Mean Width: 5.0
Total Area: 0

Species

Total Species 3
Non-Target Species: 0
Mussel Species: 3
Most Common:
Sthd Parr Density: Unknown
Ch Parr Density: Unknown
Total Density: Unknown

Overhangs

Total Overhang: 44.0
Left Overhang: 42.0
Right Overhang: 2.0
Total Undercuts: 51.0
Left Undercuts: 31.0
Right Undercuts: 20.0

Sightability

Number Cross Sections: 1
Major Pool Former:
Max Depth: 0(crossection 10 is deeper.)
Good: 9
Maybe Good: 6
Needs Work: 1

Surveys

fishandgame.idaho.gov/ifwis/SnorkelSurvey/index.html

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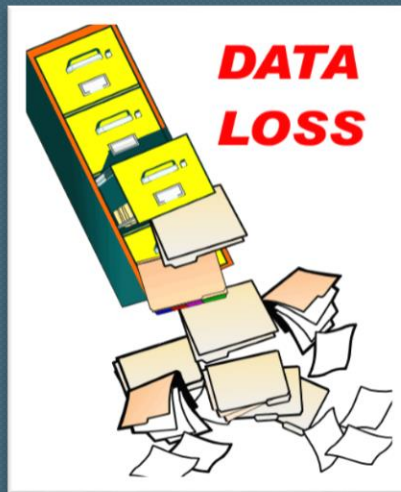
No site selected.

Resight <input type="checkbox"/> Proj Leader <input type="text" value="Apper"/> Crew <input type="text" value="Heller,"/> Survey Date <input type="text" value="11/12/2015"/> Start Time <input type="text" value="1600"/> End Time <input type="text" value="1630"/> <input type="button" value="Location"/> NEW SURVEY	Water Temp (C) <input type="text" value="18.0"/> Visibility <input type="text" value="3.00"/> Num Snorkelers <input type="text" value="4"/> Weather <input type="text" value="Fog"/> Pic Taken? <input type="checkbox"/> No Survey <input type="checkbox"/> Comments <input type="text"/> <input type="button" value="Stream Measures"/>	<input type="button" value="New Survey"/> <input type="button" value="Summary"/> <input type="button" value="Upload Survey"/> <input type="button" value="Save Survey"/> <input type="button" value="Main Form"/> <input type="button" value="Fish"/> <input type="button" value="Mussels"/>	<input type="checkbox"/> <input type="button" value="Enter"/> Pictures Taken
--	--	--	--

	Time	Posted	Is Resight	Stream Section	Date	Total Density	Leader
<input type="button" value="Select"/> <input type="button" value="Delete"/>	11/6/2015 13:53:50	no	false		11/12/2015	0	Apperson;Kim
<input type="button" value="Select"/> <input type="button" value="Delete"/>	5/29/2015 14:47:24	no	false		11/11/2015	0	Copeland;Tim

One hardware failure

- Cost of data recovery
- Cost of backup in field
- Data upload/backup to SQL



VS



Upload to SQL not Cloud

- ◉ Bypass Cloud
- ◉ Provisional Tables
- ◉ QAQC
- ◉ Append to SSS



Season Two Conclusions

- ◉ *Near* real time data entry
- ◉ External data back up is a **must**
- ◉ Reorganization of forms

Season Three

Moving forward with what we've learned

