At-sea Data Collection in the Salmon Fisheries Using GPS-enabled Android

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Organization of Fish & Wildlife Information Managers 2012 Conference and Annual Meeting – Austin, Texas October 17, 2012
Background

- CROOS (Collaborative Research on Oregon Ocean Salmon)
  - Oregon fishermen, scientists, and fishery managers work together, and fisherman collect the data
  - Collect sampling data on salmon catches and put into database
  - This research project sponsored by Pacific Salmon Comm, Oregon Salmon Comm, NOAA, Community Seafood Initiative, and Advanced Research Corp
About CROOS

Today, sampling performed using kit comprised of GPS receiver, sampling envelope

Data entered by Port Liaisons at ports

Delays in data entry and possible mistakes in recording/interpreting printed information

Desire to automate the process, making the data more readily available
Fish Trax Web Portal

- Data available on the Fish Trax web portal
At Sea Data Collection
Research Objectives

- What form factor would work for fishermen?
- Resolve display visibility
- Which devices?
- How to power the units?
- How would the system work at sea?
- How would the fishermen respond?
SeaTab System

- Developed a data entry display unit (DEDU)
- Programmed Nook Touch – opensource using HTML5 & Javascript
  - Low cost, excellent visibility, but not hardened for the elements
- Record input from fisherman, store inputs in the unit, and transmit to Android Hub
Welcome to SeaTab
Al Townsend on the Sunwest

New Trip

Connected to hub at 127.0.0.1:8080
44° 38.1278’ N  124° 2.8394’ W
DEDU Displays

Welcome to SeaTab
Al Townsend on the Sunwest

New Trip

Fishing Summary
Trip started on 9/28 at 9:18

Gear Out | Fish Caught
--- | ---
WP#001 - 123456
WP#002 - 09:18:20

Trip Info | End Trip
--- | ---

Connected to hub at 127.0.0.1:8080
44° 38.1278' N  124° 2.8394' W

Connected to hub at 127.0.0.1:8080
44° 38.1228' N  124° 2.8463' W
## Finalize Trip

<table>
<thead>
<tr>
<th>Start Time:</th>
<th>9/28 at 9:18</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Time:</td>
<td>9/28 at 9:22</td>
</tr>
<tr>
<td>Duration:</td>
<td>0:00:04</td>
</tr>
<tr>
<td>Total Catch:</td>
<td>1</td>
</tr>
<tr>
<td>Port of Landing:</td>
<td>Newport, OR</td>
</tr>
</tbody>
</table>

### Barcode Information

- **Barcode:** 123456
- **Waypoint 001 caught at 09:18:19**

### Measurements

- **Length:** 67 cm
- **Depth:** 84 fm

### Location Information

- **Connected to hub at 127.0.0.1:8080**
- **Position:** 44° 38.1228' N 124° 2.8463' W

### Buttons

- **Resume Trip**
- **Submit**
SeaTab System...

- Hub server
- DEDU client
- Samsung Precedent Android smartphone
- Receive inputs from Nook, stamp with GPS position, and package for transmission
SeaTab 3-Device System...

- And included a wireless hotspot
- Verizon MiFi
- Allows DEDU Nook to talk to Hub, and Hub to talk to shore
3-Device Results

- Able to demonstrate full connectivity

Issues

- Loss of data
- Power up sequencing issues
- Connectivity issues
- Poor display responsiveness
- Fishermen had difficulty in doing BOTH SeaTab and CROOS
SeaTab 1- Device System

- Integrated the Hub and the DEDU into a Google Nexus
- Resolved the comm problems
- Nexus able to stamp with GPS position
- Data transmission delayed until in range of wireless
Results

- 62 of 63 samples successfully transferred to Fish Trax database
- Able to keep power for the 3 day trip

Issues

- Poor screen visibility in bright sunshine
- Data mismatch for one vessel (SeaTab vs. CROOS) due to delayed data entry
Lessons Learned

- Taking technology to fishermen - no easy matter
  - Keep operation as simple as possible
- Harsh sea environment – both the ocean and handling fish
- Power demands (GPS, wireless, pinging rate)
- Barcode scanner - not worth it
Conclusions

- Issues at-sea with harsh environment, portability, and usability
  - Smartphones moving to waterproof
- Bringing technology to fishermen a challenge
- Android platforms present a remarkably effective and low cost means to collect and transfer data in many environments
Acknowledgements

- Pacific Salmon Commission
- Oregon Salmon Commission
- NOAA
- Community Seafood Initiative
- Oregon fishermen Jeff Feldner, Corey Feldner, Chip Welty, Al Townsend, Kevin Bastien
- Jennifer Wimpress (Port Liaison)
Thank you!

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