Improved Field Computing: taking advantage of advances in technology

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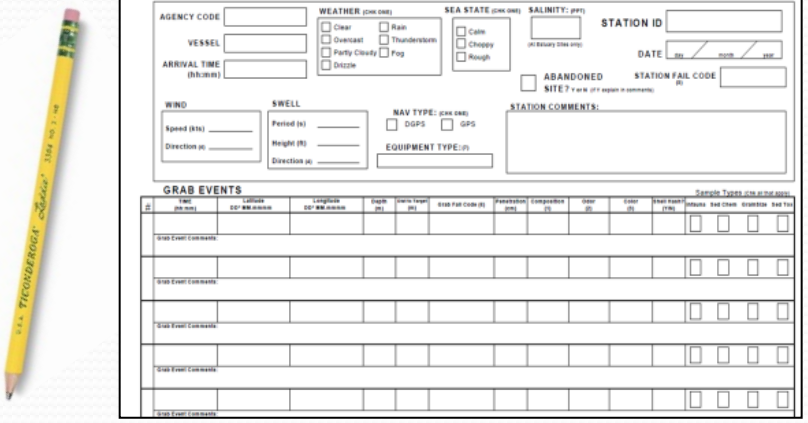
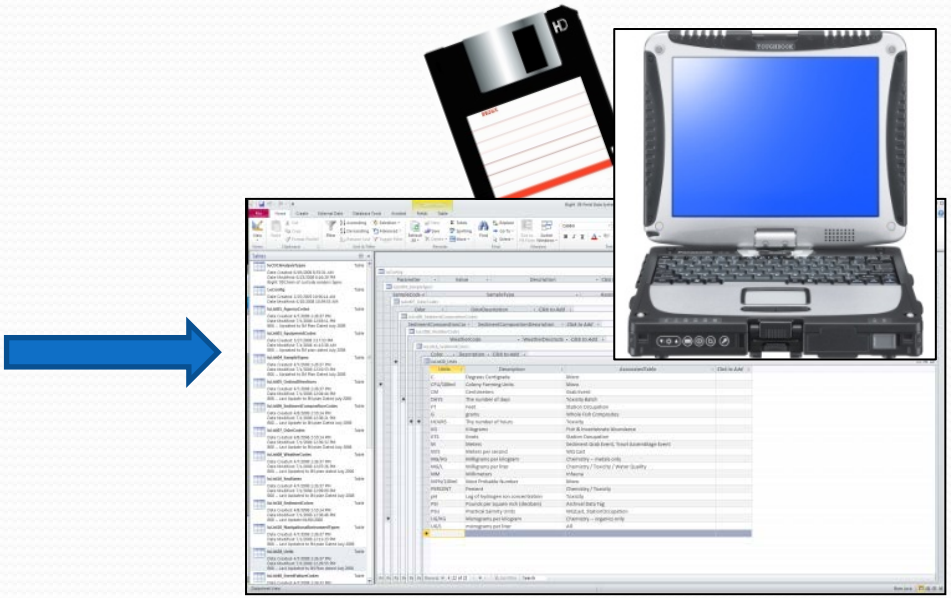
Background: Field data collection technology

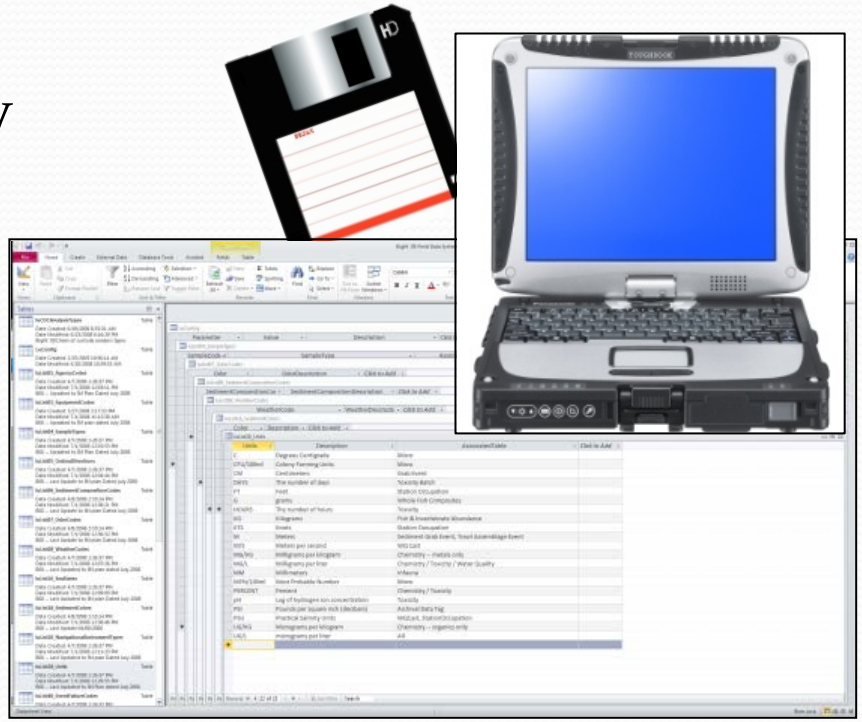
- Over the last decade we've moved from paper forms to laptop field computers
  - SCCWRP has played an important part in this process.





Laptops served us well, but…

- Several disadvantages:
  - Ruggedized units are heavy and bulky
  - Expensive
  - Limited functionality
  - Difficult to maintain and upgrade
- Mobile devices provide us several advantages



Advantages of mobile devices

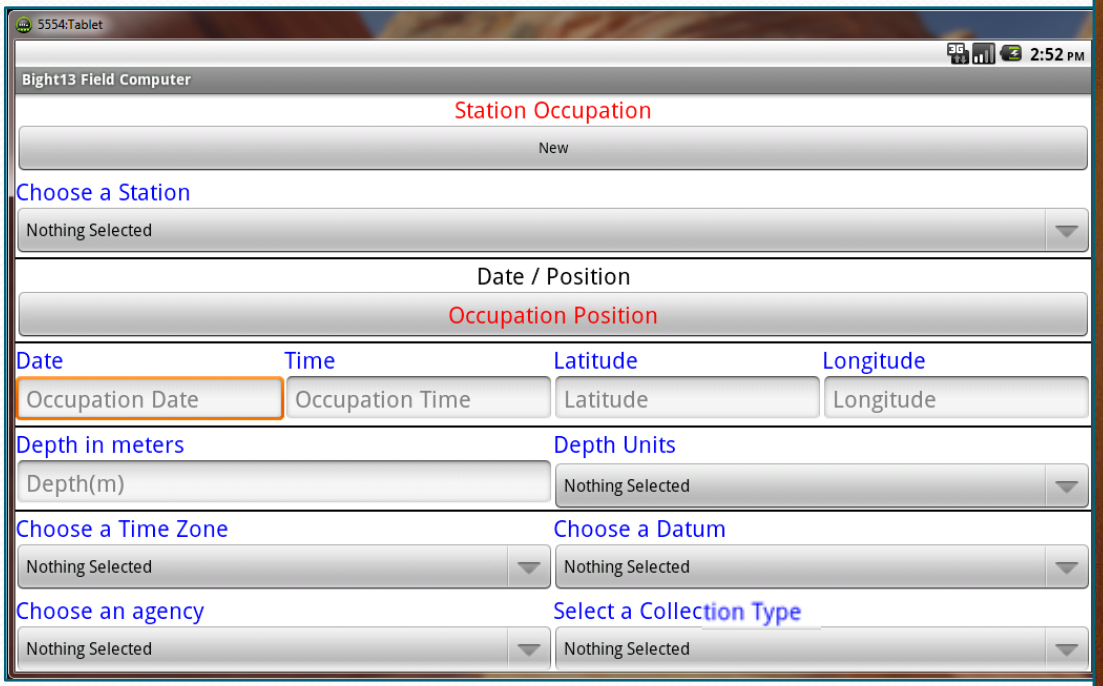
- Inexpensive
- Easy-to-use
- Portable and lightweight
- Fewer devices to carry/manage
- 2-way connectivity
- Opportunities to integrate with additional sensors

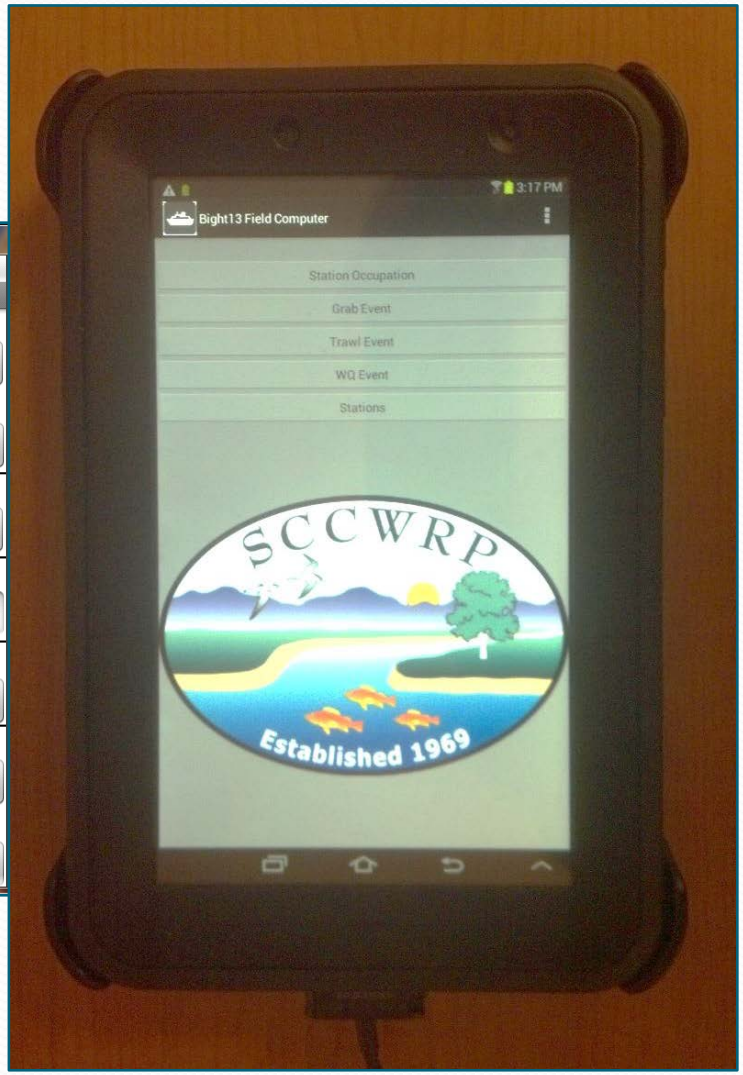
A **new** research area

- Today I will present three aspects of our mobile strategy:
  - Current capabilities: Mobile field computer
  - Short-term additions
  - Vision for the future, incorporating advanced technology

It's already real

Bight '13 Field Computer





- Similar to the Bight '08 field computer, but with advantages

Connectivity: data available from the field as it is collected

https://portal.sccwrp.org/databases/B13/grab.php

Bight 2013 Sediment Grab Event

Data current as of :
May 28, 2013 1:44 pm PDT

StationID	StationWaterDepth	StationWaterDepthUnits	SampleDate	SampleTime	GrabEventNumber	SamplingOrganization	GearCode	GrabLatitude	GrabLongitude	Datum	Penetration	Pe
A1000	24	M	2013-03-28	11:45:27	1	SCCWRP	Singel Van Veen	33.1334	-118.543	AGPS	12	cm
A1000	24	M	2013-03-28	11:56:33	2	SCCWRP	Single Van Veen	33.1635	-118.593	AGPS	12	cm
A1000	24	M	2013-03-28	12:06:33	3	SCCWRP	Single Van Veen	33.1534	-118.563	AGPS	12	cm
A1000	24	M	2013-03-28	12:12:33	4	SCCWRP	Single Van Veen	33.1034	-118.503	AGPS	12	cm
A1000	24	M	2013-03-28	11:45:27	1	SCCWRP	Singel Van Veen	33.1234	-118.523	AGPS	12	cm
A1000	24	M	2013-03-28	11:56:33	2	SCCWRP	Single Van Veen	33.1635	-118.593	AGPS	12	cm
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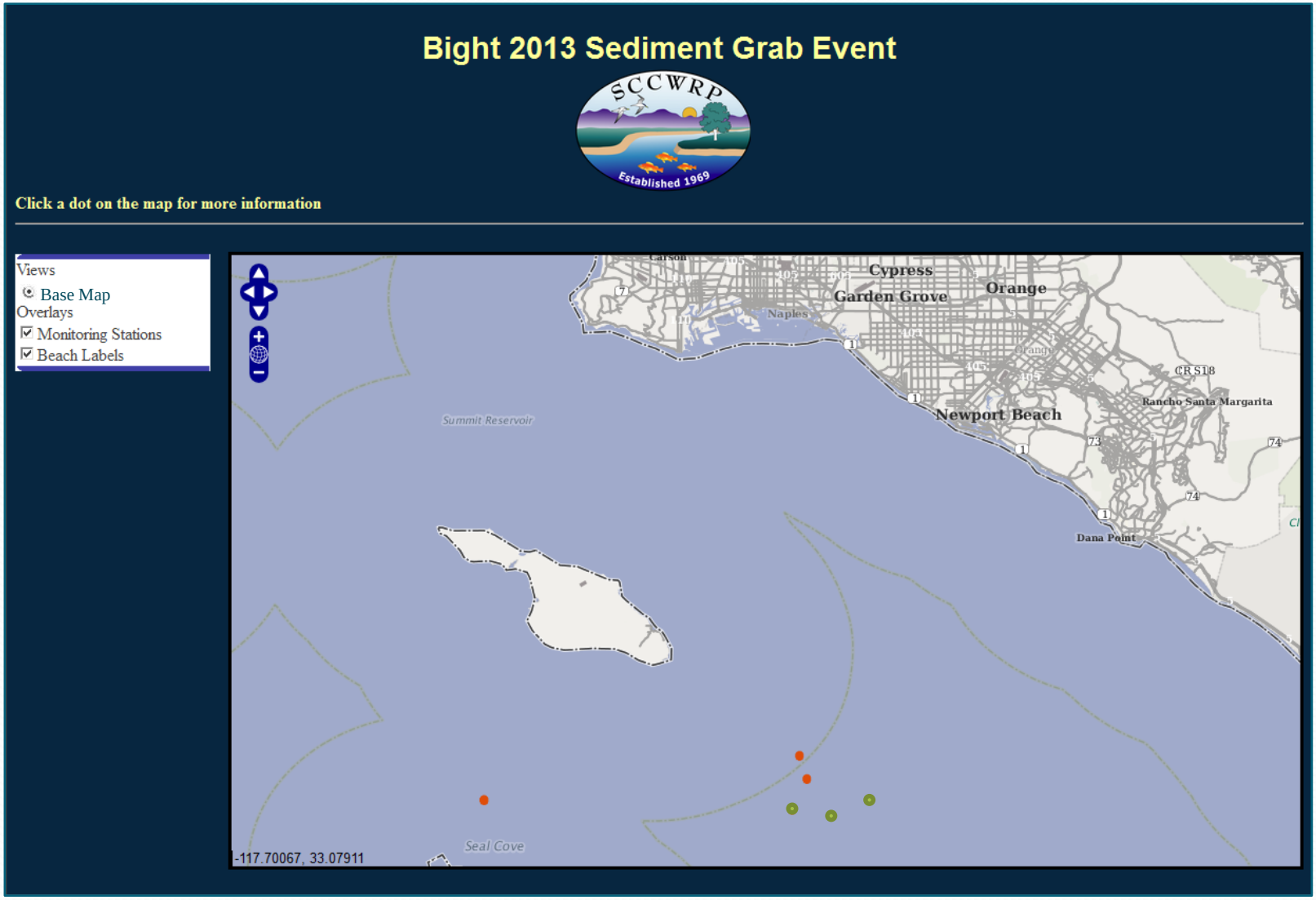
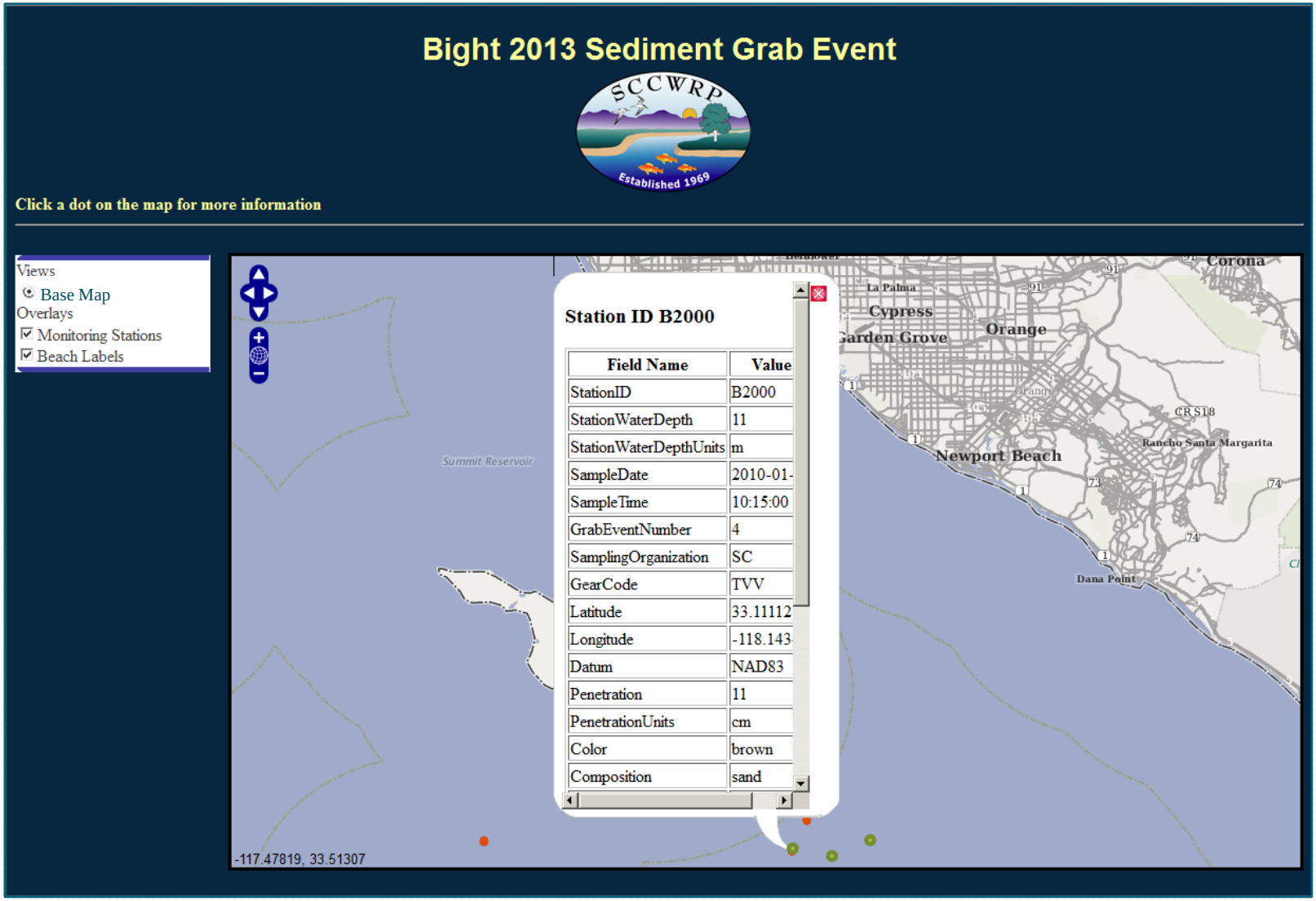
A1000	24	M	2013-03-28	12:06:33	3	SCCWRP	Single Van Veen	33.1534	-118.563	AGPS	12	cm

View data on a map Download as CSV

You can see which sites are complete



And see the data for any site



Beyond Bight: a new research direction

- This provides a jumping off point
- Our REAL vision is to develop new capabilities that were not feasible in the past
  - Software development
  - Interface with additional hardware
  - Data analysis tools

Inherent mobile capabilities:

- Things we're already working on [directly tied to field records]
  - Voice recognition for adding field notes
  - Camera and video capture
- Other opportunities to use other sensors
  - Magnetometer
  - Ambient air temperature
  - Air pressure
  - Humidity
  - Illumination
  - Sound intensity

Leveraging two-way connectivity

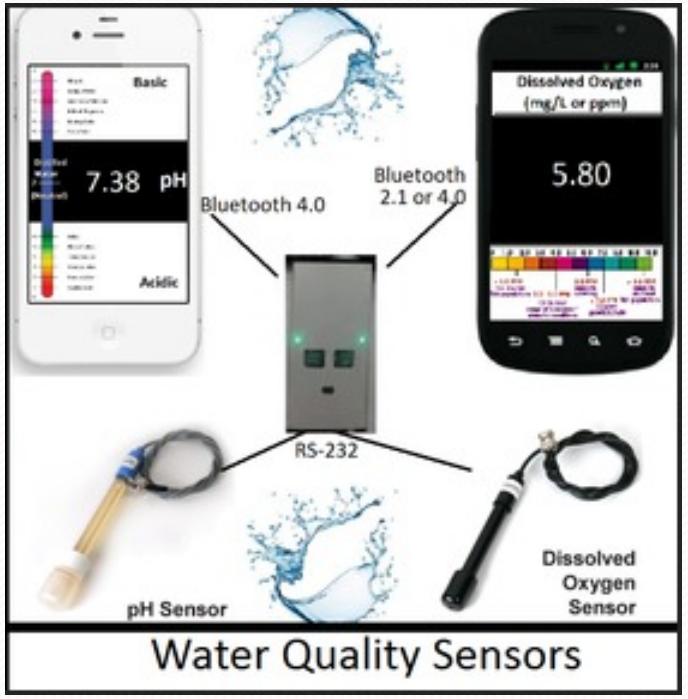
- Access supplemental data sources in real-time
  - Weather data (current conditions)
  - Buoy data (e.g. wave height, period)
  - Maps and aerial images (e.g. Google Maps)

Linking to other field sensors

- Connectivity offers exciting opportunities to tie other sensors to the cell phone
  - A unified database that directly captures data without re-typing or converting data after-the-fact
  - We are ready to begin work on this next
  - We've begun actively building relationships with technology developers to develop new applications and approaches

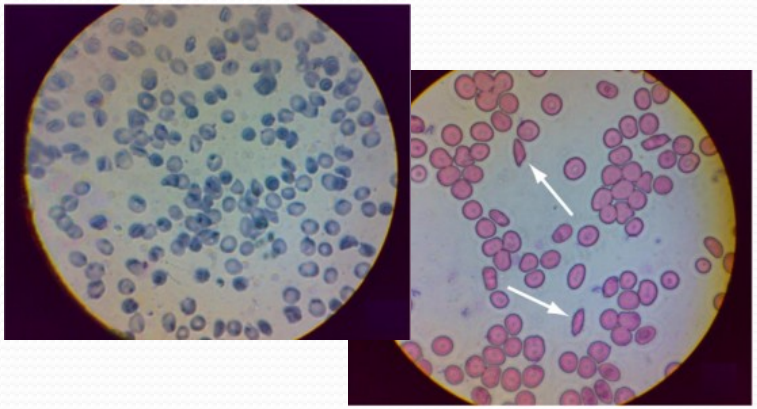
Add-on devices and sensors:

- Wireless connectivity with the phone for any sensor
  - Lightweight water quality probes
  - Environmental sensors
    - No need to carry data loggers or other hardware to the field



Cell phone microscopes:

- Development has focused on mobile medical imaging and telemedicine applications
- We are working with CellScope developers to apply these technologies to environmental analysis

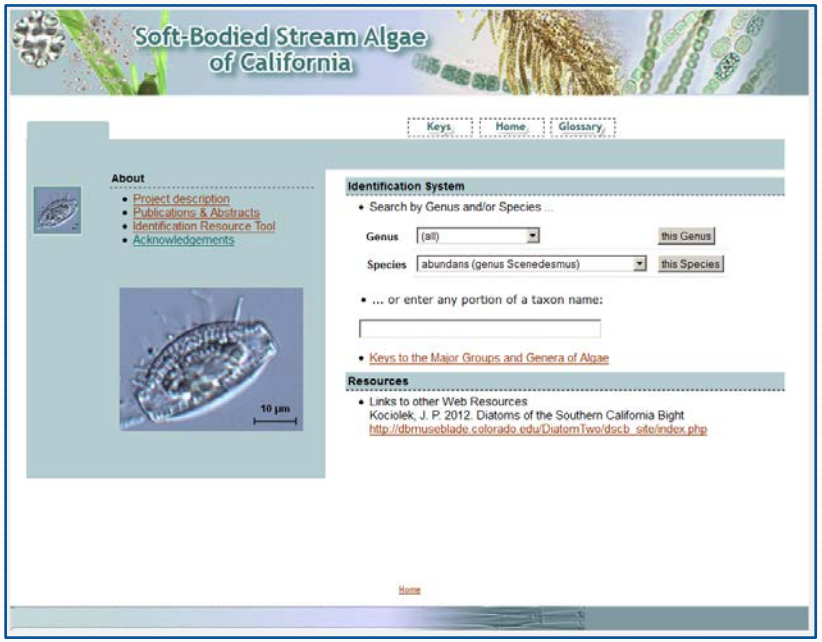


In-field microscopy

- Possibilities for field acquisition of imagery:
  - Algae
  - Diatoms
  - Benthic invertebrates
- Provides for field fresh specimen images without preservation or degradation
- Image catalogs for algae are already developed

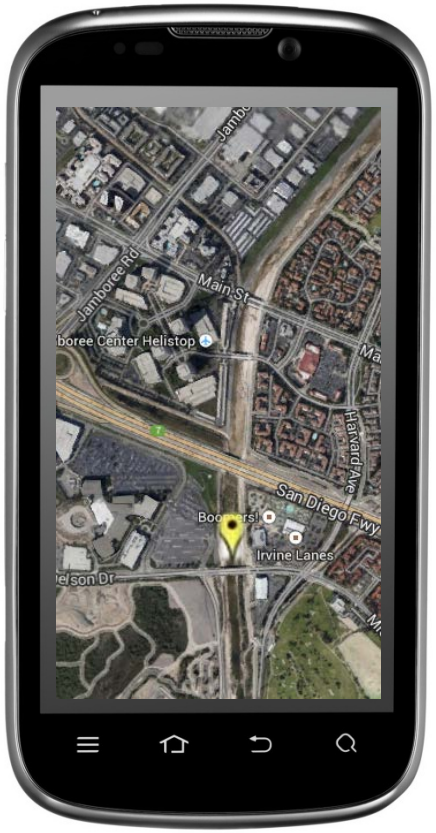
We're starting with algae

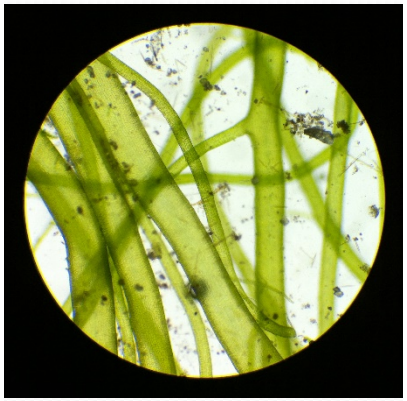
- Identification of algae is not as far along as some other areas
- SCCWRP is a world leader helping to develop a web-library for identification of soft-bodied algae in Southern California.



Two-way connectivity for analysis

- Leverage expertise while in the field
- Does this make sense given my location?
- Should the crew bring a sample back for further analysis?





Automating data interpretation

- New opportunities
  - Developing analysis algorithms based on field imagery
  - Mobile apps to assist or fully automate taxonomic ID
  - In-field data QA/QC
  - Data analysis results and visualization

SCCWRP as a unique interface

- We are not the only group developing these technologies
- We ARE one of the few that can connect all aspects (science, technology and user applications)

Thank You

Questions?

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