Improved Field Computing: taking advantage of advances in technology

> Steve Steinberg Information Management and Analysis

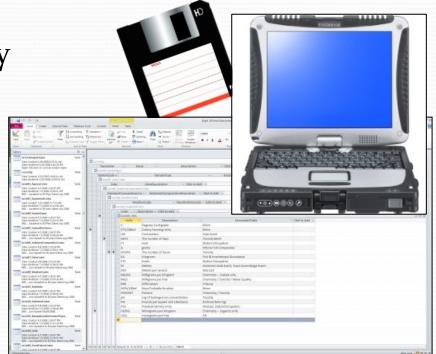
# Background: Field data collection technology

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

STATION OCCUPATION	PAGE of		
AGENCY CODE			
ARRIVAL TIME Diszle ABANDO		Land and L	
WHO     SWELL     NAV TYPE: pricese)     STATION COMME       Speed Bits)     Preved Inty     0 Gars     0 SPS       Direction pr     Depending to the priceses     EQUIPMENT TYPE: priceses     Station comment	NTS:		
GRAB EVENTS	Other Color Intel Table Science Pypes (the art tod appr) (the real Pypes (the art tod appr) (the real Pypes (the art tod appr)	The second secon	Mar Benchmert (Carabal ) See Strategiese Mark (Sander Sander San
Grap Event Comments:		Control Contro Control Control Control Control Control Co	Product jobs Temperer Compared to the second data
Stat Contractor		Bit	F     OPT     The solution is law     Name gash        Mode     Mode     Mode        Mode     Mode     Mode        V     Notice     Mode        Mode     Notice (Second Mode        Notice     Notice (Second Mode        Notice (Second Mode     Notice (Second Mode
Eus Frei Canada		Alter Extension (C. 1996) E. (Ed. U. Ma BB)	M     Nation year and the state of
		bi still, budieren beine pros constant 44 mmi 2011 10 mmi 2011 10 mmi	1075/2006 Minist Freductor Minist PREDICT Pressure Distribution (Freductor)

#### 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





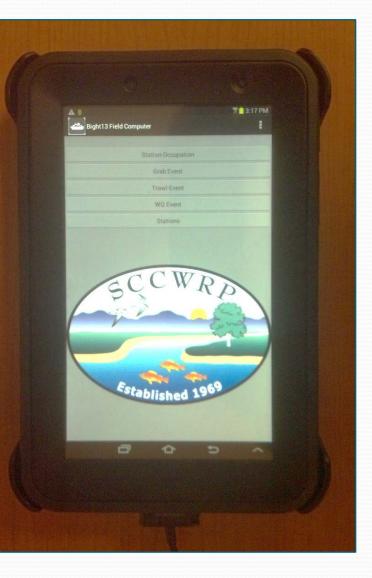
#### A new research area

- 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

	_	-			
😄 5554:Tablet	and the second se			F	🗄 📶 🛃 2:52 рм
Bight13 Field Computer					
	Statio	on O	ccupation		
		N	ew		
Choose a Station					
Nothing Selected					~
	Da	te /	Position		
	Оссиј	oatic	on Position		
Date	Time		Latitude	Longitude	
Occupation Date	Occupation Time		Latitude	Longitude	
Depth in meters			Depth Units		
Depth(m)			Nothing Selected		-
Choose a Time Zone			Choose a Datum		
Nothing Selected		-	Nothing Selected		-
Choose an agency			Select a Collection Type		
Nothing Selected			Nothing Selected		-

## • Similar to the Bight 'o8 field computer, but with advantages



## Connectivity: data available from the field as it is collected

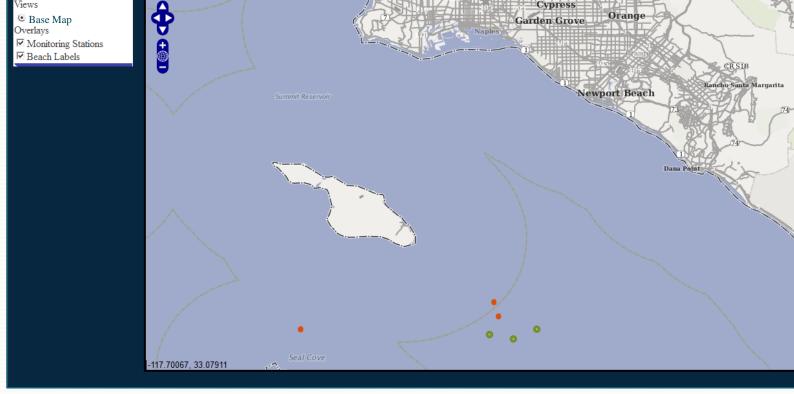
https://portal.sccwrp.org/databases/B13/grab.php						😭 ⊽ C <sup>a</sup> ] [🚼 ▼ Google					۹ م	+ -
Bight 2013 Sediment Grab Event												
StationII	StationWaterDepth	StationWaterDepthUnits	SampleDate	SampleTime	GrabEventNumber	SamplingOrganization	GearCode	GrabLatitude	GrabLongitude	Datum	Penetratio	n Pe
A1000	24	М	2013-03-28		1	SCCWRP	Singel Van Veen	33.1334	-118.543	AGPS		cn
A1000	24	М	2013-03-28	11:56:33	2	SCCWRP	Single Van Veen	33.1635	-118.593	AGPS	12	cn
A1000	24	М	2013-03-28	12:06:33	3	SCCWRP	Single Van Veen	33.1534	-118.563	AGPS	12	cn
A1000	24	М	2013-03-28	12:12:33	4	SCCWRP	Single Van Veen	33.1034	-118.503	AGPS	12	cn
A1000	24	М	2013-03-28	11:45:27	1	SCCWRP	Singel Van Veen	33.1234	-118.523	AGPS	12	cn
A1000	24	М	2013-03-28	11:56:33	2	SCCWRP	Single Van Veen	33.1635	-118.593	AGPS	12	cn
A1000	24	М	2013-03-28	12:06:33	3	SCCWRP	Single Van Veen	33.1534	-118.563	AGPS	12	cr
A1000	24	М	2013-03-28	12:12:33	4	SCCWRP	Single Van Veen	33.1034	-118.503	AGPS	12	cr
A1000	24	М	2013-03-28	11:45:27	1	SCCWRP	Singel Van Veen	33.1234	-118.523	AGPS	12	cr
A1000	24	М	2013-03-28	11:56:33	2	SCCWRP	Single Van Veen	33.1635	-118.593	AGPS	12	cn
A1000	24	М	2013-03-28	10.06.00	3	SCCWRP	Single Van	33.1534	-118.563	AGPS	10	cn

View data on a map Download as CSV

<u>an</u> - ×

#### You can see which sites are complete

# Bight 2013 Sediment Grab Event Sedime

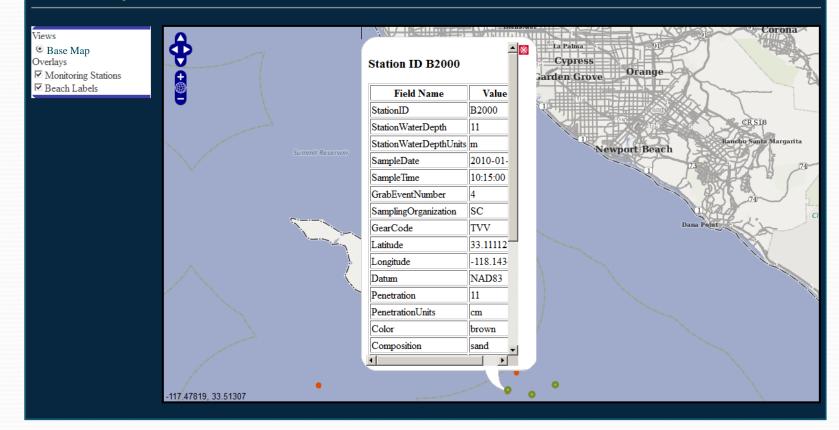


#### And see the data for any site

#### **Bight 2013 Sediment Grab Event**



#### Click a dot on the map for more information



#### 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:

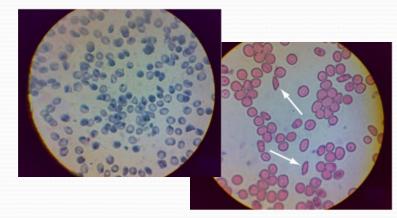
- Wireless connectivity with the phone for any sensor
  - Lightweight water quality probes
  - Environmental sensors
    - No need to carry data loggers or other hardware to the field





#### Cell phone microscopes:

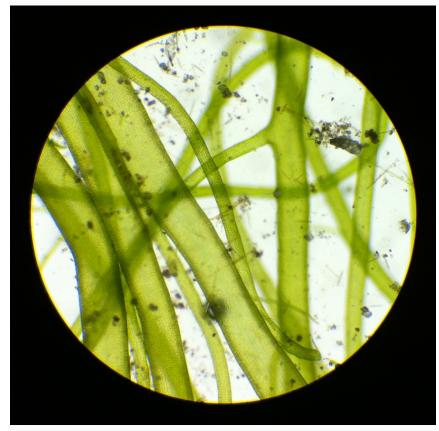
- Development has focused on mobile medical imaging and telemedicine applications
- We are working with CellScope developers to apply these technologies to environmental analysis





### 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



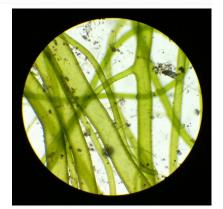
#### We're starting with algae

- Identification of algae is not as far along as some other areas
- SCCWRP is a world leader helping to develop a weblibrary 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 Commission 7 June 2013

#### 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**?

#### Steve Steinberg Information Management and Analysis steves@sccwrp.org 714-755-3260