21st Century Shellfish Sanitation: Electronic Mapping & Field Data Collection Initiatives

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Technological Updates

- Paperless
  - Shoreline Survey
  - Aquaculture Inspections
  - Field Collection
    - Water Quality
    - Phytoplankton
    - Biotoxin
- Interactive Online Map
- Online Data Portal

Shoreline Survey (SLS)

Purpose: Identify actual and potential pollution sources in growing area

Method: Door to door survey of coastal (<500 ft from shore) properties

- Trained DMR staff examine onsite wastewater treatment systems for malfunctions
- Inspect property and observe/document all actual or potential sources of pollution
  ◦ GPS location, pollution source codes, written description

Goal: Obtain a count of pollution sources in the growing area

Problem 1: Field work is inherently time and manpower intensive

DMR must survey all shoreline adjacent to harvestable shellfish waters at least every 12 years

- ~3000 mi (including islands) of shoreline requiring survey
  - Shoreline divided into ~2.5 mile segments (GASSID)
  - 2–6 GASSIDs completed per day
  - ~120 GASSIDs visited per year
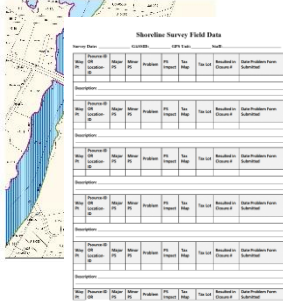 - **~60 crew-days per year (in teams of two)**

Problem 2: Entire SLS workflow requires excessive time and resources

- Prep: Paper tax maps, GIS maps, field sheets, problem forms **The dreaded shoreline survey binder**
- Post: Manual data entry
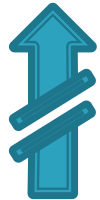 - 30–45 min/crew–day * 60 crew–days = 30–45 extra hours/season
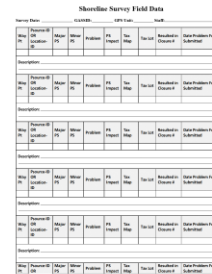
Old SLS workflow

Create **HUNDREDS** of pages of maps, data sheets, & prior waypoint descriptions before each field season

Record field data on paper data sheets, take location using handheld GPS
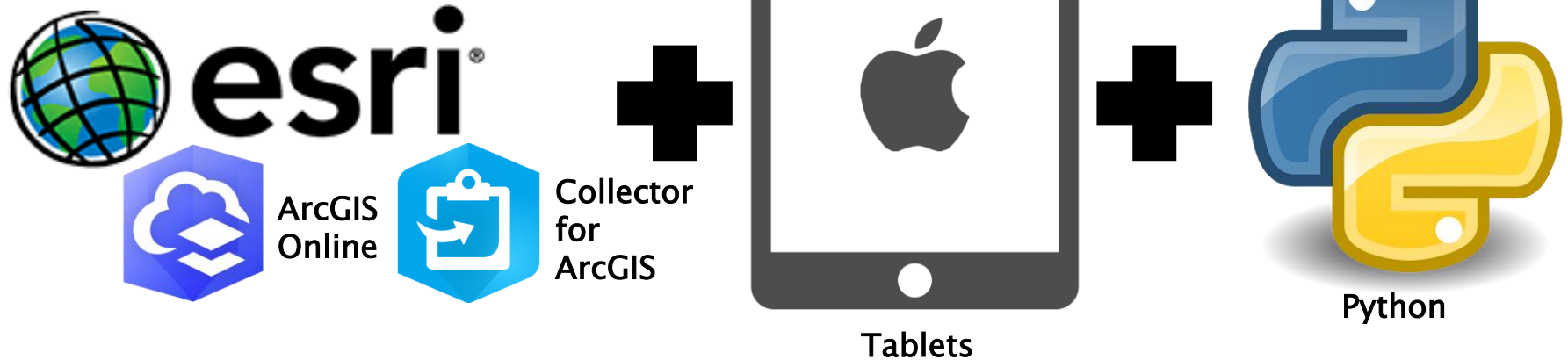
START OVER

Manually update Shoreline survey GIS layers
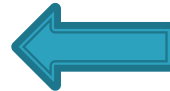
Enter data manually in MARVIN (30–45 min per day)

Solution: Reduce time/paper with electronic data collection and automated data entry

Key
Components:

ArcGIS Online

Collector for ArcGIS

Tablets

Python

New SLS Workflow:

- Tax maps
- Shoreline survey data
- Known pollution sources
- Auto progress recording
- Classifications
- Standardized data collection

- Cloud storage

Field data recorded in Collector on iPad, synced to SLS Map Service

Updated MXD of SLS Map Service

ESRI ArcGIS Online

File GDB downloaded of all SLS data

- Instant data transfer from tablet to database

SLS Map Service published to ArcGIS Online w/ most up to date data from Collector & MARVIN

GIS layers stored in File GDB

Python Script fills in spatial attributes and copies data to MS Access database

MARVIN
ORACLE

Python Script queries all data, builds GIS layers

New data inspected, QC'd, & uploaded from MS Access to MARVIN, Location IDs assigned

- No transcription errors to QC

Aquaculture Inspections

- Viewable map
  - Off-line download
  - Clickable lease points
    - Lease details
    - Lease history
- Standardized data entry

Collector App

Field Collection (Piloting)

- Water Quality
- Biotoxin
- Phytoplankton

Field Collection (Piloting)

- Station location QC
  - Set distance to station IDs
- Date/time stamping
- Automatic lat/lon metadata
- Warnings for incomplete data entries
- No manual data entry
  - No transcription errors/QC
- Lab bench sheet on iForm

Field Collection (Piloting)

- Requires iForm license
- Paper doesn't require charging
- Purchasing tablets/smart phones
- Protective cases
- Lab may need to use iForms

HIDDEN COSTS

Additional Benefits of ArcGIS Online

- ESRI ArcGIS Online subscription
- Easy to edit (~current within 24hrs)
- Publicly viewable
- Higher detail than legal notice maps
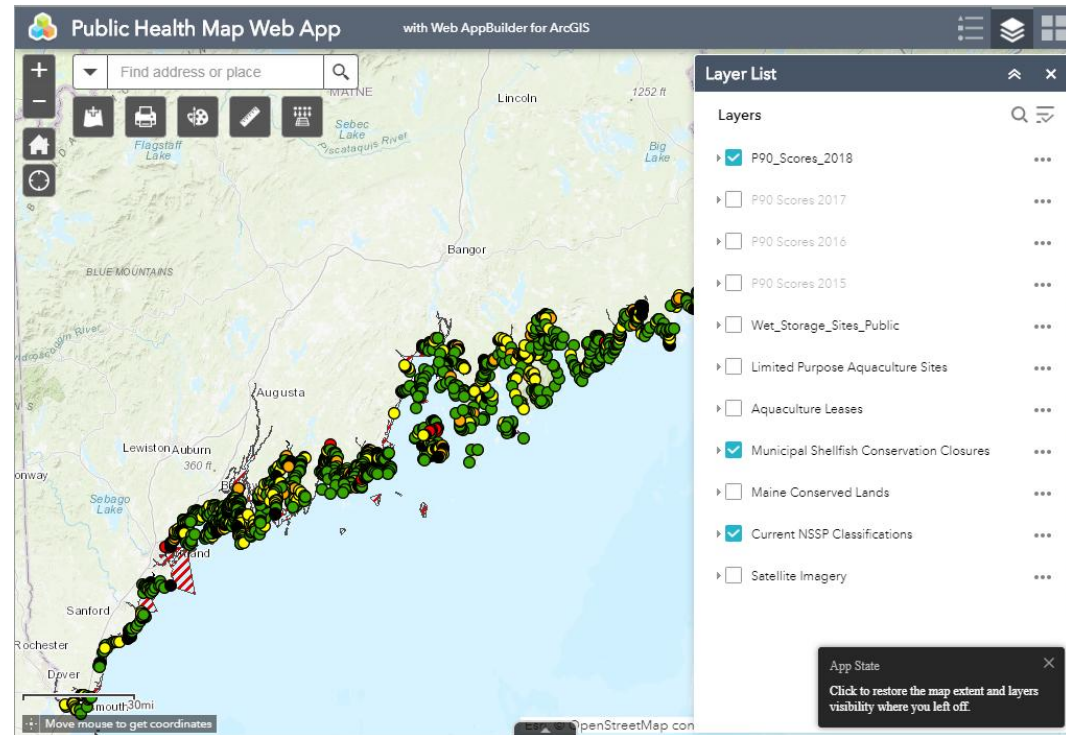
Online Interactive Map
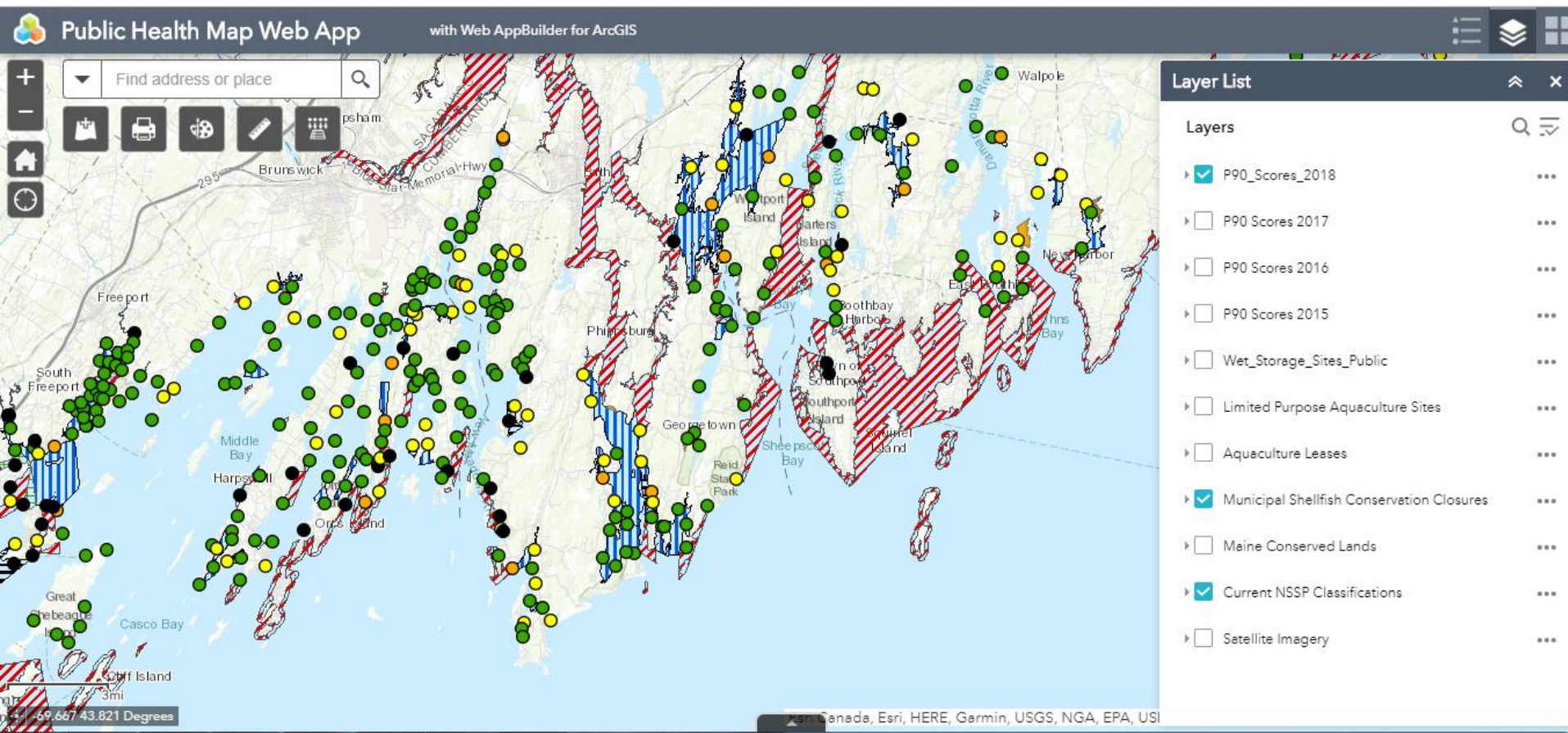
[T]o determine where it is safe and legal to harvest shellfish, I use __ EVERY TIME/ MOST TIMES

	Pro harvester	Pro farmer	Rec/ subsist harvester	Local shellfish comm member
Total Respondents	*158*	*36*	*21*	*35*
Hotline	63%	53%	48%	69%
==Maps accompanying descriptions==	57%	80%	59%	65%
Fellow harvesters	45%	7%	52%	34%
Email notices from DMR	37%	86%	57%	54%
Text descriptions	31%	50%	24%	33%
Other, please specify	20%	17%	17%	33%
Local shellfish comm member	16%	4%	17%	22%
DMR staff	14%	16%	24%	24%

Courtesy of Tora Johnson, University of Maine Machias

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Open Data Portal

ArcGIS Online also allows hosting of downloadable data through DMR Open Data website

Next Steps

- Reorganize DMR website to emphasize web map
- Integrate tabulated station data (map/open data sites)
- Incorporate all closures
  - WQ classifications ✔
  - Municipal conservation ✔
  - Biotoxin
  - Conditional area
  - "Flood"
- Phone Application

Questions?