California's Surface Water Ambient Monitoring Program

Data In and Data Out: Status on the SWAMP Database and Tools Being Developed for Biological Data

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California Water Boards

SWAMP Surface Water Ambient Monitoring Program

Outline

- Introduction
- Data Out
  - Reporting Module
- Data In
  - Data Entry and Submittal Process
  - Comparison of SWAMP and FlexiGrid Forms

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Basic Approach to Data Management

- SWAMP – Surface Water Ambient Monitoring Program – stand-alone monitoring, QA, and data management program
- CEDEN – California Environmental Data Exchange Network – statewide data repository and exchange system
- SWAMP and CEDEN were designed to store the necessary data and QA elements for water quality, tissue, and bioassessment (marine and freshwater benthos) programs
  - SWAMP mandated to store data of 'known and documented quality' which necessitates a lot of associated metadata

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Basic Approach to Data Management

- Freshwater bioassessment data is complex
  - 20+ pages of data sheets; 1,000-1,300 records per sample event
- **Plan ahead** – much easier to incorporate before sampling begins
  - Write contracts to field and lab crews incorporating the use of these tools and formats for data submissions
    - Labs have the data but need to specify what to report
  - Participate in trainings (recorded and live) and educate yourself, field crews, and labs
  - Set aside funds for data management

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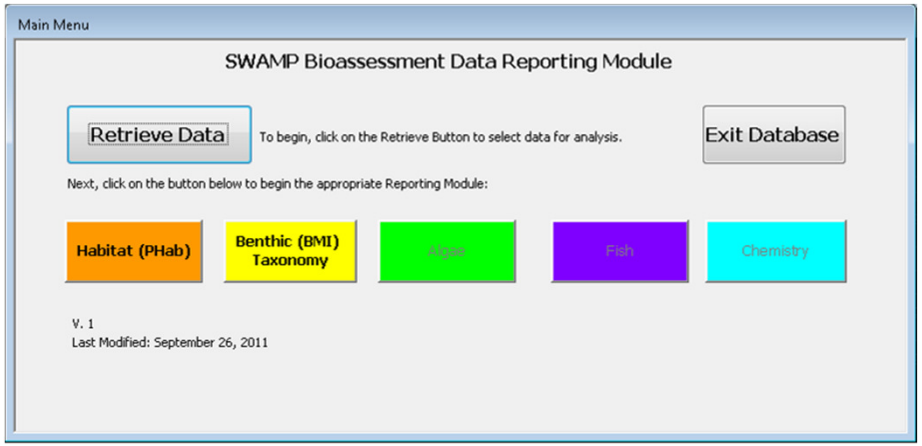
Data Out

- Historically, relied on CalEDAS Reporting Module (RM) for reporting BMI taxonomy
- Goal for SWAMP is to create RM for:
  - Benthic Macroinvertebrate (BMI) Taxonomy
  - Physical Habitat (PHAB) including Algae Cover
  - Algae Taxonomy
  - Chemistry & Toxicity (water, sediment)
  - Fish



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Reporting Module (RM)

- SWAMP
  - MS Access desktop application
  - Data imported through internet from SWAMP or CEDEN SQL Server Data Warehouse
  - Full functionality including ability to change settings

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Reporting Module (RM)

- SWAMP
  - MS Access desktop application
  - Data imported from SWAMP or CEDEN through internet from SQL Server Data Warehouse
  - Full functionality including ability to change settings
- CEDEN
  - Online web application
  - Data imported from CEDEN only, which will have SWAMP data
  - Same underlying structure as SWAMP RM but settings defaulted based on reporting requirements

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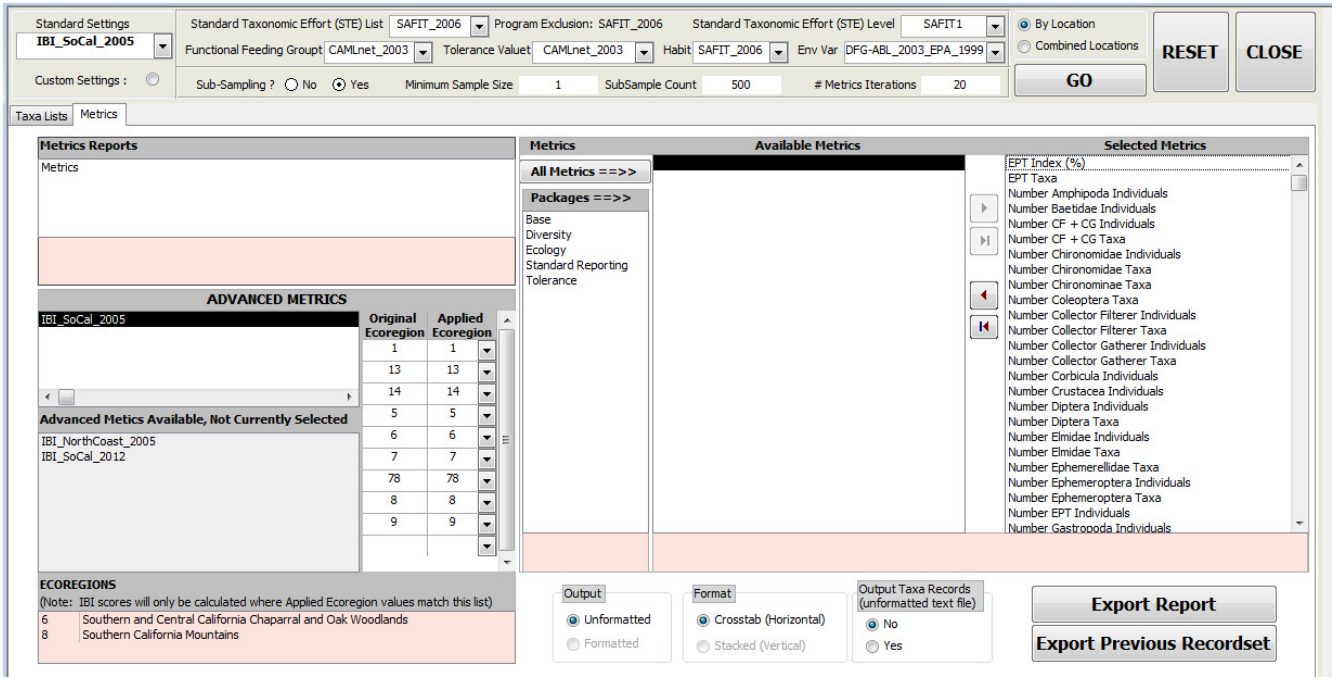
Benthic Macroinvertebrate (BMI) RM

- Completed in June 2011
  - Data only retrieved from SWAMP right now but CEDEN is developing their Data Warehouse
  - Same metrics as CalEDAS but some updated
  - IBI calculations for Southern California and North Coast
    - Spring 2012 – Eastern Sierra, Central Valley



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Physical Habitat (PHAB) RM

- In development with first draft in Jan 2012
- Working with Pete Ode and Andy Rehn (DFG-ABL), Revital (RWQCB 2), and Raphael Mazor (SCCWRP) to incorporate metrics
  - EMAP (Kaufmann et al. 1999)
  - SWAMP
  - RWQCB 2
- Will include Algae PHAB cover data and metrics

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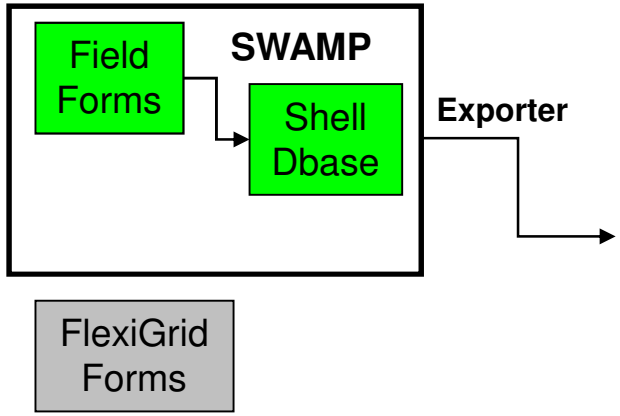
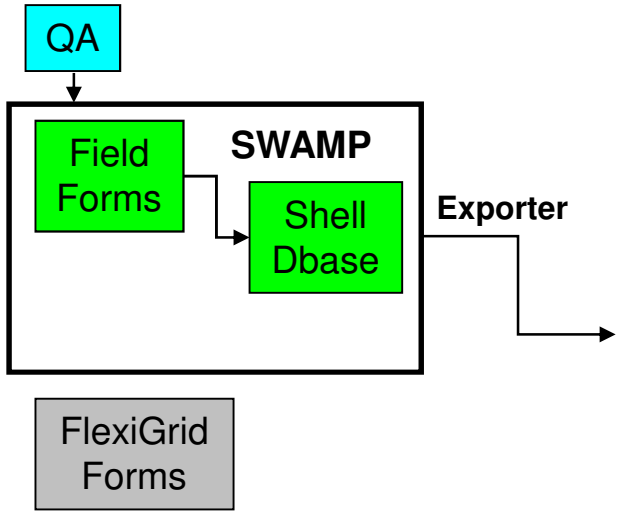
Data In – Data Entry and Submittal Process

- Step 1 – Obtain SWAMP Bioassessment Field Forms and utilize resources
  - Go to MLML SWAMP website to download a zip package containing MS Access front-end field forms, stand-alone MS Access back-end Shell database, and MS Access Export application
    - Access 2003 is most stable environment; ok to use Excel 2007/10
  - Watch Training Videos and download documentation



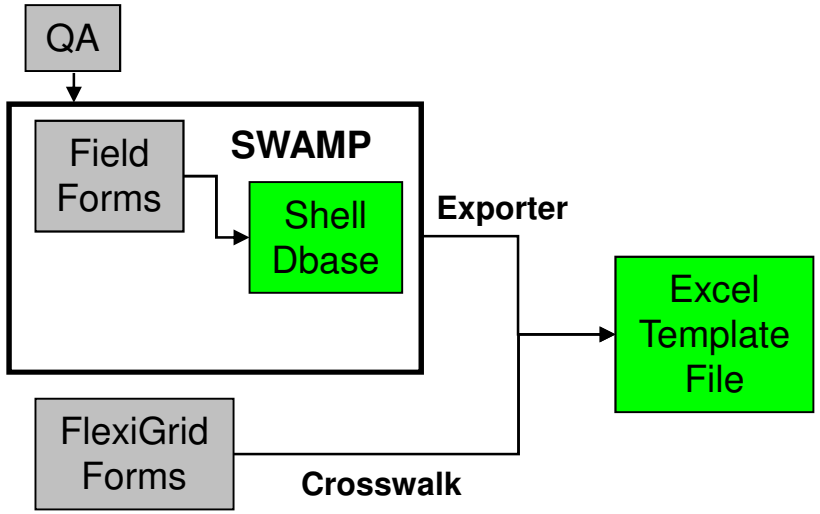
Data In – Data Entry and Submittal Process

- Step 2 – Collect and enter data in the field or in the office
  - Forms look similar to hard copy forms
  - Follows SWAMP Wadeable Streams Protocol (2007)
  - QA/QC check data using pre-built queries in the forms

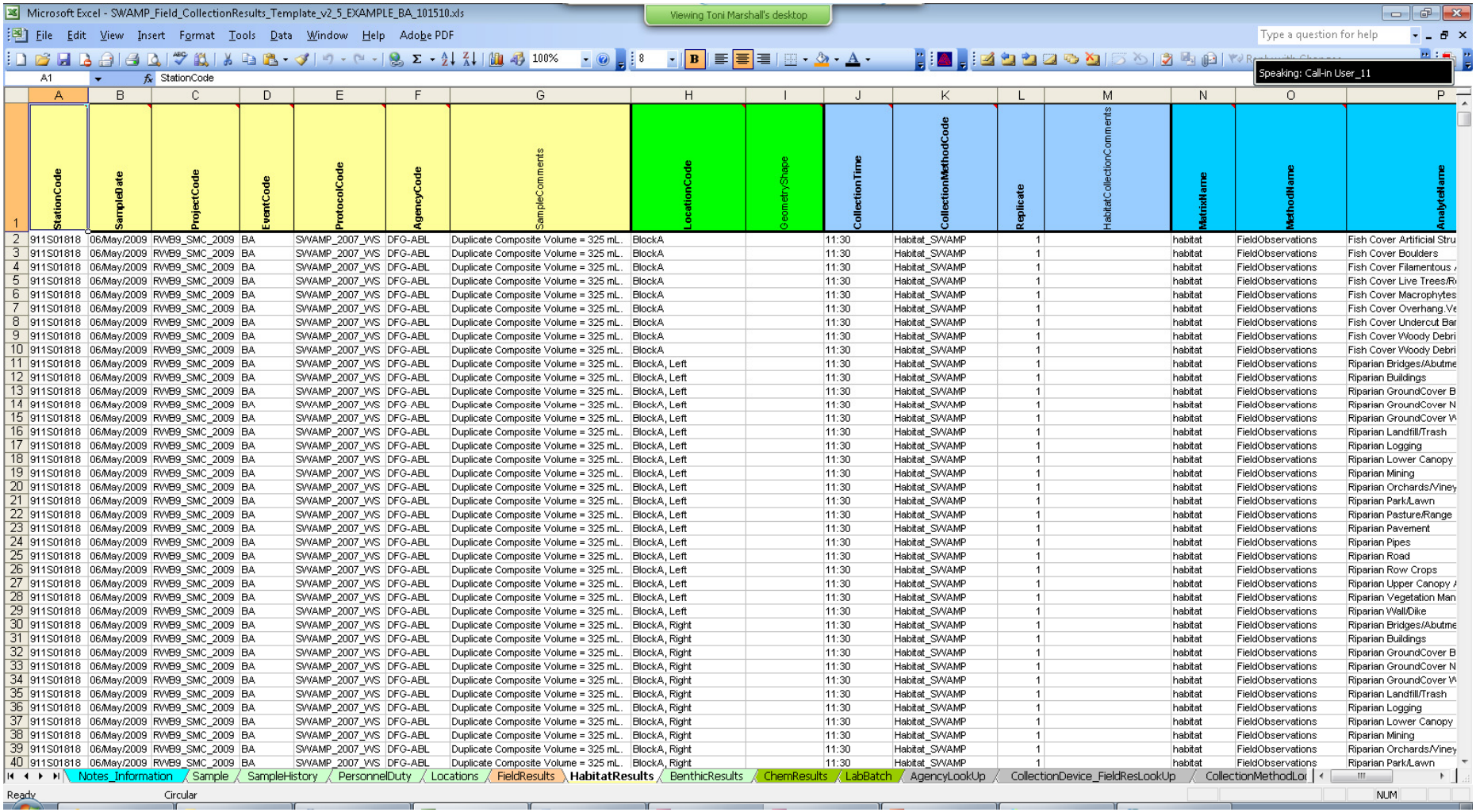


Data In – Data Entry and Submittal Process

- Step 3 – Export data to Excel Template Upload file
  - Run MS Access Export application to create MS Excel Template Upload file
    - Contains sample, field, and habitat result data and collection information for taxonomy (BMI and algae) and chemistry samples



SWAMP/CEDEN Excel Upload file - example

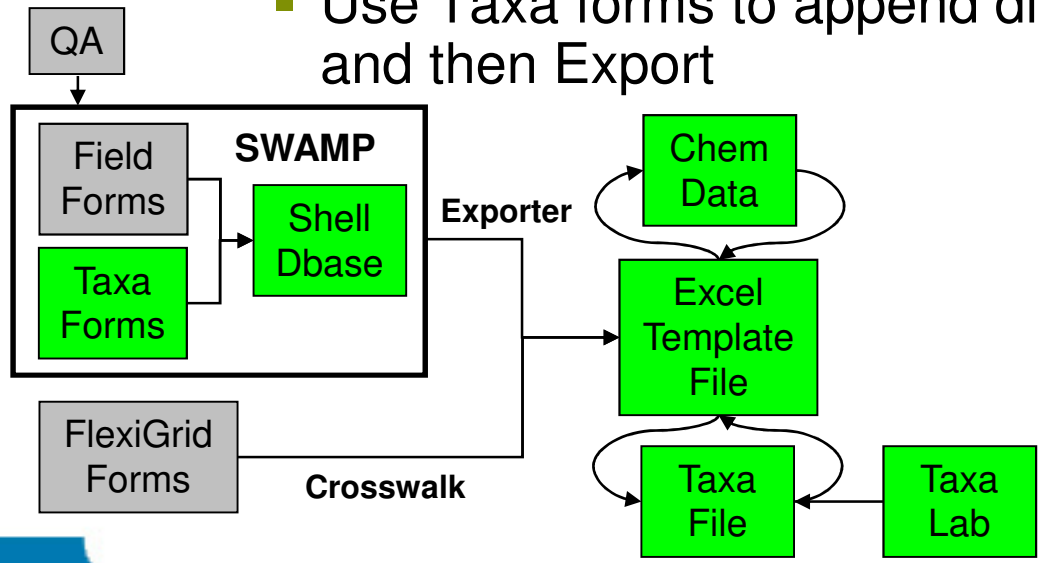


Microsoft Excel - SWAMP_Field_CollectionResults_Template_v2_5_EXAMPLE_BA_101510.xls

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	StationCode	SampleDate	ProjectCode	EventCode	ProtocolCode	AgencyCode	SampleComments	LocationCode	GeometryShape	CollectionTime	CollectionMethodCode	Replicate	HabitatCollectionComments	MatrixName	MethodName	AnalyteName
2	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Artificial Stru
3	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Boulders
4	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Filamentous
5	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Live Trees/R
6	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Macrophytes
7	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Overhang.Ve
8	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Undercut Bar
9	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Woody Debri
10	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Fish Cover Woody Debri
11	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Bridges/Abutme
12	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Buildings
13	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover B
14	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover N
15	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover W
16	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Landfill/Trash
17	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Logging
18	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Lower Canopy
19	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Mining
20	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Orchards/Viney
21	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Park/Lawn
22	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Pasture/Range
23	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Pavement
24	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Pipes
25	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Road
26	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Row Crops
27	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Upper Canopy
28	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Vegetation Man
29	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Left		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Wall/Dike
30	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Bridges/Abutme
31	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Buildings
32	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover B
33	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover N
34	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian GroundCover W
35	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Landfill/Trash
36	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Logging
37	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Lower Canopy
38	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Mining
39	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Orchards/Viney
40	911S01818	06/May/2009	RWB9_SMC_2009	BA	SWAMP_2007_WS	DFG-ABL	Duplicate Composite Volume = 325 mL.	BlockA, Right		11:30	Habitat_SWAMP	1		habitat	FieldObservations	Riparian Park/Lawn

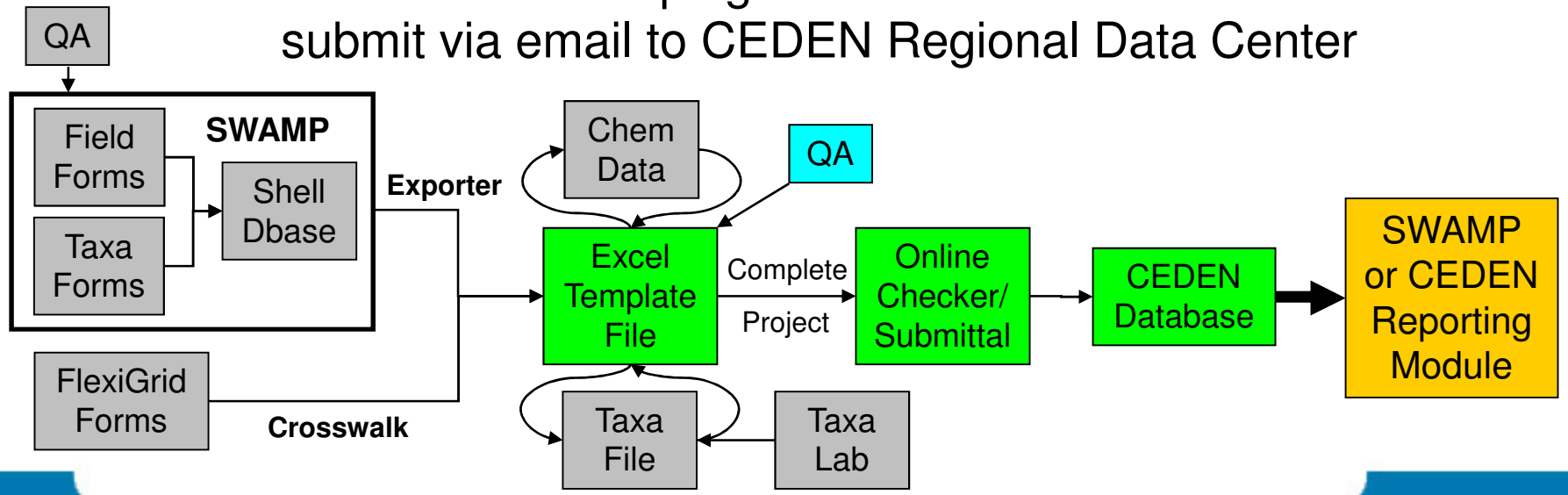
Data In – Data Entry and Submittal Process

- Step 4 – Add Chemistry and Taxonomy Results, if collected, to Excel Template File
  - Add chemistry results to ChemResults tab
  - For Taxonomy (BMI and algae), two options:
    - Lab enters data into BenthicResults tab through queries or manual entry and returns to Project Manager to include in Excel Template file
    - Use Taxa forms to append directly to Shell database and then Export



Data In – Data Entry and Submittal Process

- Step 5 – Finalize Excel Template Upload file as a complete project for online checking and submittal
  - Once data (PHAB, taxonomy, chemistry) compiled into one file and QA/QC checked, two options:
    - SWAMP has online checker and submittal through MLML SWAMP website for SWAMP-only data
    - CEDEN is developing online checker and submittal so submit via email to CEDEN Regional Data Center



SWAMP & FlexiGrid Discussion: PHAB Entry Only

- Software
  - SWAMP = MS Access
  - FlexiGrid = MS Excel
- Data Entry
  - SWAMP = PHAB, Water Quality
    - Automated and manual data entry checks against erroneous entries
  - FlexiGrid = PHAB, Water Quality
    - Only manual data entry checks

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- Data Entry
  - SWAMP = PHAB, Water Quality
    - Automated and manual data entry checks against erroneous entries
  - FlexiGrid = PHAB, Water Quality
    - Only manual data entry checks
  - Both field and desktop entry available
    - FlexiGrid allows data entry between/among sheets, which allows for immediate corrections
    - SWAMP requires completion of each sheet before proceeding, which requires use of pre-built queries for corrections

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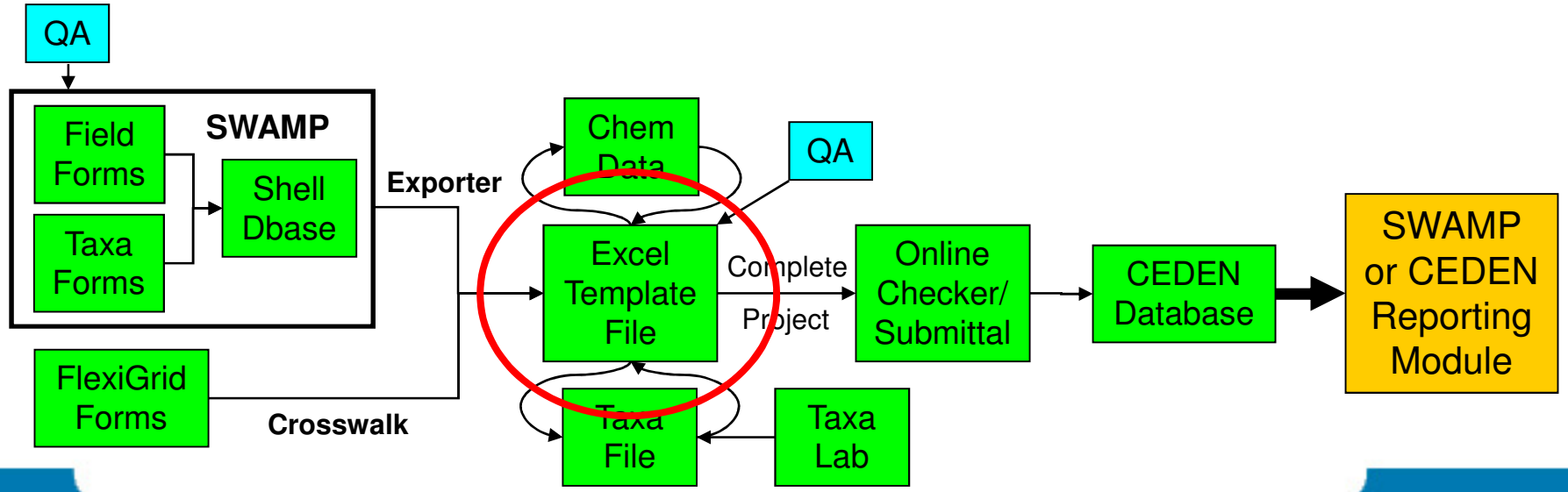
SWAMP & FlexiGrid Discussion: PHAB Entry Only

- Data Output
  - Both require exporting data to MS Excel Template Upload file
    - SWAMP uses MS Access Export application to automatically create upload file for single or multiple samples/visits
    - FlexiGrid uses crosswalk to create upload file with minor tweaking for individual samples/visits



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- Metric Calculations
  - SWAMP = PHAB Reporting Module
    - Processes multiple samples across projects
    - Time lag between data entry and metric calculations
  - FlexiGrid = PHAB metrics
    - Potentially instant output with minor processing of individual samples/visits
  - Both = Metrics are organized in database ready format as well as in tabular format for reporting and plotting

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  - Both = Metrics are organized in database ready format as well as in tabular format for reporting and plotting
- Technical Support
  - CEDEN = Help Desk including some IT support, tutorials, supporting documentation; no costs (currently)
  - FlexiGrid = Initial training, data processing SOPs, and ongoing support by Revital; associated minimal costs

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Contact Information

- Marco Sigala
  - msigala@mlml.calstate.edu
  - 831-771-4173
- MLML SWAMP web site (Documentation & Resources)
  - http://swamp.mpsl.mlml.calstate.edu/
- Help Desk
  - Data Comparability – Stacey Swenson (swamphelpdesk@mlml.calstate.edu)
  - QA Comparability – Will Hagan (swampqa@mlml.calstate.edu)
- Thanks to SWAMP DMT, Liz Cook, Bruce Bealer, Pete Ode, Doug Post, Andy Rehn, Raphael Mazor, Revital Katznelson

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