Status: Best Practices for Shipboard Underway Flow-through Sea Water Systems

RVTEC 2023
October

UNOLS
UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

Ocean best practices

R2R
ROLLING DECK TO REPOSITORY

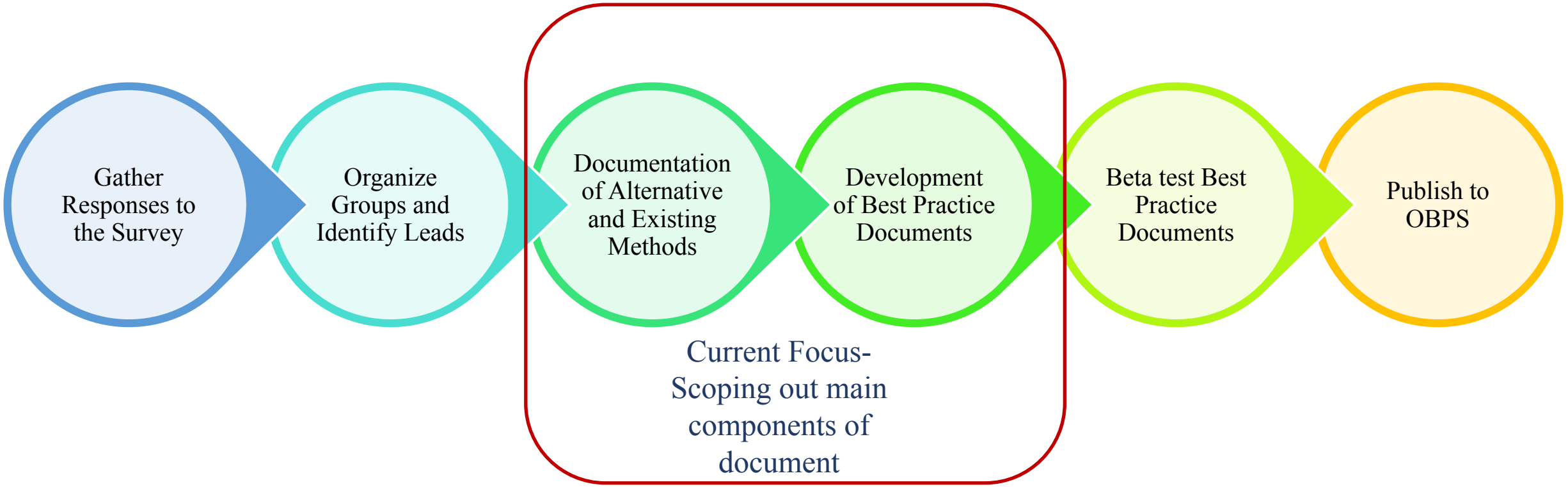
RCRV
Regional Class Research Vessels

Flow-through Working Group Lead and Members

Shawn Smith
Rolling Deck To Repository
SAMOS Initiative
COAPS, Florida State University

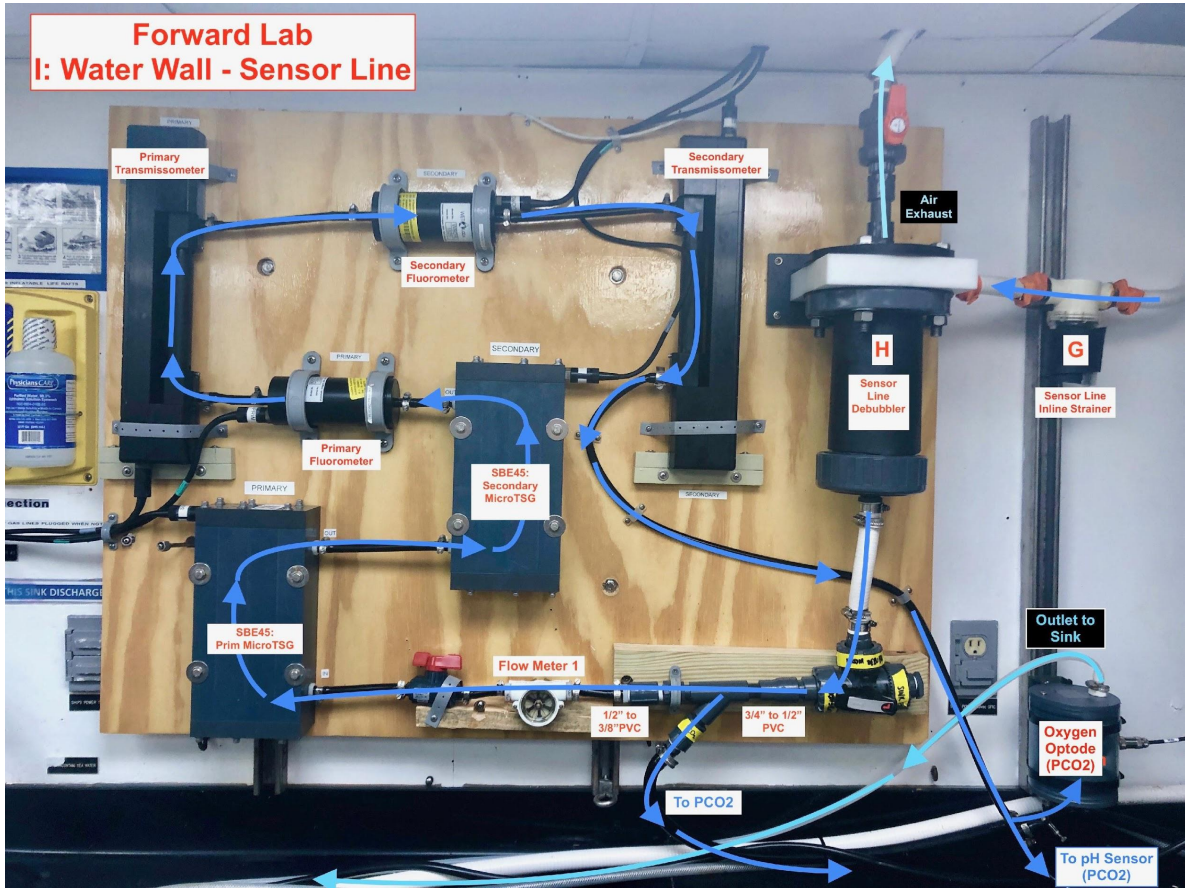
- Margaret Archibald: WHOI
- Kristin Beem: OSU/RCRV
- Matt Bihrle: Sea Education Association
- Katie Watkins-Brandt: NOAA/OMAO
- Lynne Butler: URI
- Sara Rivero-Calle: UGA
- Camille Couzi: Australian Antarctic Division
- Taylor Crockford: WHOI
- Floyd Howard: Australian Antarctic Division
- Rebecca Hudak: WHOI
- Morgan Hudgins: UGA
- Kate Kouba: OSU
- Ben Lowen: UGA
- Gabe Matthias: URI
- Imojen Pearce, Australian Antarctic Division
- Webb Pinner: Capable Solutions
- Peter Shanks: Australian Antarctic Division
- Emily Shimada: OSU
- Mackenzie Smith: LUMCON
- Laura Stolp: WHOI
- Jeremy Taylor: NOAA/JIMAR
- Michael Tepper-Rassumssen: OSU

Our Approach



Flow Through Systems - 2023 Update

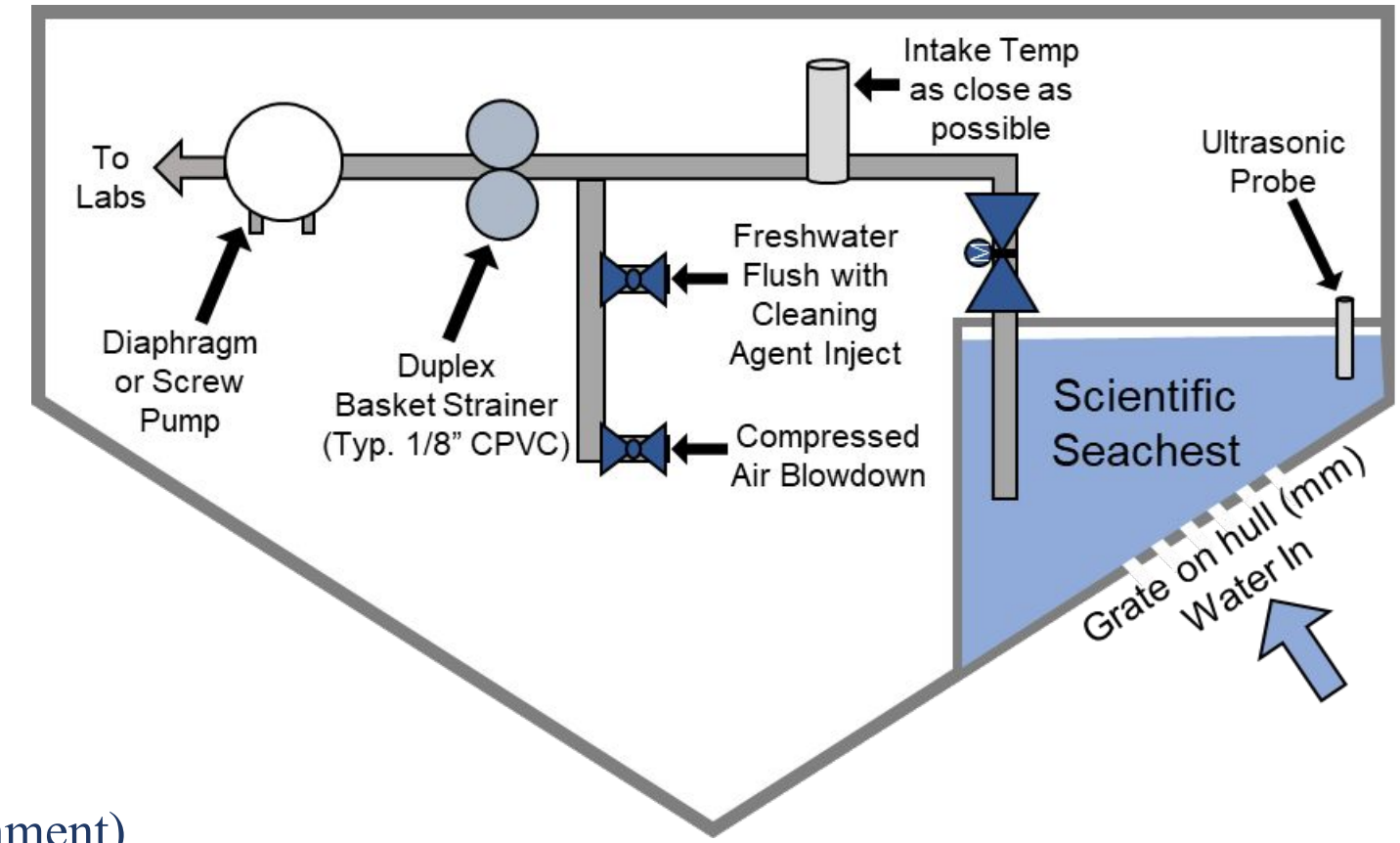
- Working group reconvened in 2023
- Monthly virtual meetings
- Gathering information and defining content
- Draft document in outline form
- Working group scope:
  - Research vessels
  - Salty (sea) water environment
  - Components of system from intake to sensor connections
  - Does not include science sensors connected to system



R/V Atlantic Explorer water wall, Image courtesy BIOS

Flow Through Systems - Content

- Components of system
  - One or more intake ports
  - Seachest
  - Pipes and tubing
  - Pumps
  - Flow meters
  - Debubblers
  - Water wall
  - Sensors
  - Overboard drain (or grey water containment)



Flow-through system schematic, K. Watkins-Brandt

Flow Through Systems - Contents

- System design and installation (details for each component)
  - Science considerations
  - Lots of discussion on pumps
    - Impeller, screw, diaphragm, peristaltic
    - Listing pros and cons
  - Placement of pumps, flow meters
  - Water wall design
  - Materials, valves, pipe sizes, etc.

Flow Through Systems - Contents

- Data to record
  - Flow rates
  - Which intake or pump is in use
  - System start/stop
- Metadata and documentation
  - Engineering schematics
  - Use of electronic logs
- Cleaning of each system component
  - Develop checklists, decision trees
  - Timing and methods
  - Routine task and maintenance

R2R Elog Sample from Sikuliaq

Event	dateTimeUTC	GPS_Time	Instrument	Action	Transect	Station	Cast	Latitude	Longitude	Seafloor	Author	Comment
20230626.0347.001	20230626.0347	2023/06/26 03:47:29	ADCP WH300	start	NaN	NaN	NaN	71.319431	-163.015931		bMcKiernan1	start recording WH300 for station
20230626.0347.002	20230626.0347	2023/06/26 03:47:52	centerBoard	deploy	NaN	NaN	NaN	71.319441	-163.015944		bMcKiernan1	deployed
20230626.0347.003	20230626.0348	2023/06/26 03:48:16	Underway Science seawater	start	NaN	NaN	NaN	71.319454	-163.015961		bMcKiernan1	online flow for ADCP station
20230626.0415.001	20230626.0415	2023/06/26 04:15:27	Underway Science seawater	stop	NaN	NaN	NaN	71.321279	-163.020414		bMcKiernan1	Moving CB to SAFE
20230626.0415.002	20230626.0415	2023/06/26 04:15:48	centerBoard	recover	NaN	NaN	NaN	71.321579	-163.020730		bMcKiernan1	SAFE
20230626.0415.003	20230626.0416	2023/06/26 04:16:13	ADCP WH300	stop	NaN	NaN	NaN	71.321942	-163.021143		bMcKiernan1	Moved CB to SAFE
20230626.0416.001	20230626.0416	2023/06/26 04:16:35	Underway Science seawater	start	NaN	NaN	NaN	71.322247	-163.021535		bMcKiernan1	Back online flow at SAFE CB

Flow Through Systems - Contents

- Other considerations
  - Recommendations for periods of inactivity
  - Alternative operating environments
    - Polar or ice conditions
    - Fresh water
    - Contaminated waters

USCGC Healy in the ice

Questions/Interested?

Get involved!

- Reach out to the lead of the working group you are interested in joining
  Shawn R. Smith, srsmith@fsu.edu

- Oceans Best Practices Website (where final BP document will live):
  https://www.oceanbestpractices.org/

Discussion

1. Are there any obvious omissions in the presented content?

Discussion

2. What are your biggest challenges with your flow-through system?

Discussion

3. What type of piping, tubing exist on your ship?

Discussion

4. What type of basket strainer are you using:

- CPVC, stainless steel, other?
- Duplex or single?

Discussion

5. What practices or procedures do you use to clean your
   - Sea chest?
   - Pipes, valves, etc. that make up the flow-through system?
   - Water wall?

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6. How often are these components cleaned?

Discussion

Other comments or suggestions?