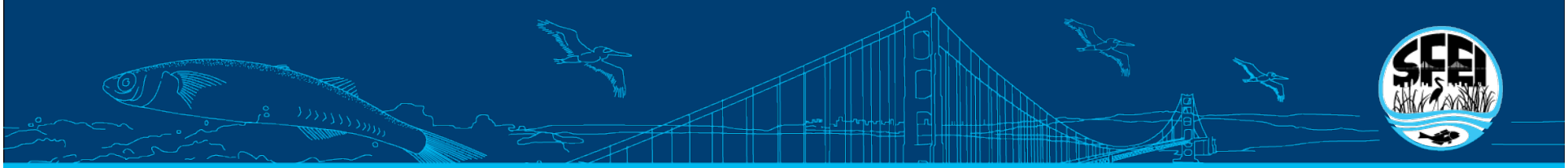
Update on the RMP Specimen Banking Protocol

Emerging Contaminant Workgroup Meeting
October 17th 2008



Develop ‘ideal’ strategy

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Determine current inventory and future storage needs

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Determine freezer space needed

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Determine where will we store the ≤ -80 °C samples

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Implement strategy

Purpose of the RMP Specimen Bank

A repository for sample material that can be used to document and assess the quality of the SF Estuary through retrospective chemical analyses

1) Time trend analyses of known or as yet unidentified chemical contaminants
2) Investigation of emerging contaminants
3) Future verification of analytical results if quality assurance issues arise

-20 °C Storage

Advantages

- Less expensive
- Less maintenance
- Suitable for inorganics
- Suitable for persistent organics for at least 10-15 years?

Disadvantages

- Preservation of persistent organics for > 15 years uncertain
- Integrity of reactive, less persistent chemicals questionable
- Moisture migration, ice crystals, tissue desiccation (dry weight analysis only)
- Tissue sample color changes, bacterial action highly suspected (NIST)
- Changes in lipid content

≤ -80 °C Storage

Advantages

- ‘Absolute’ preservation of chemical integrity in long-term?
- No moisture migration, tissue color change

Disadvantages

- More expensive
- More maintenance

Water

- Samples for archives not collected
- Labs keep extracts for one year

Table 1. Collection and Storage of RMP Sediment Samples

Sample	# of containers	Container type	Analysis	Purpose	Hold Temp (°C)
Historic sites	1	250 ml, glass	POPs	Time trends, emerging contaminants, QA/QC	-18
	1	250 ml, HDPE or PP	PFCs, metals	Time trends, emerging contaminants, QA/QC	-18
	1	125 ml, Teflon	POPs	Long-term archive	-80
	1	125 ml, HDPE or PP	PFCs, metals	Long-term archive	-80
Random sites	1	250 ml, glass	POPs	Emerging contaminants, QA/QC	-18
	1	250 ml, HDPE or PP	PFCs, metals	Emerging contaminants, QA/QC	-18
Cores	-	-		Time trends, emerging contaminants, QA/QC	-18

Table 2. Collection and Storage of RMP Bivalve, Sport Fish, and Bird Egg Samples

Sample	# of containers	Container type	Analysis	Purpose	Hold Temp (°C)
All sites	5	15 g, glass	POPs	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, HDPE or PP	PFCs, metals	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, Teflon	POPs	Time trends, emerging contaminants, QA/QC	-80
	1	50 g, Teflon	POPs	Long-term archive	-80
	1	50 g, HDPE or PP	PFCs, metals	Long-term archive	-80

Table 3. Priorities for preservation of RMP samples when less than the preferred mass (300 g) of tissue is available.

Tissue Mass Available (g)	# of containers	Container Type	Purpose	Hold Temp (°C)
150	5	15 g, glass	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, HDPE or PP	Time trends, emerging contaminants, QA/QC	-18
150-200	5	15 g, glass	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, HDPE or PP	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, Teflon	Long-term archive	-80
200-250	5	15 g, glass	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, HDPE or PP	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, Teflon	Long-term archive	-80
	1	50 g, HDPE or PP	Long-term archive	-80
250-300	5	15 g, glass	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, HDPE or PP	Time trends, emerging contaminants, QA/QC	-18
	1	50 g, Teflon	Long-term archive	-80
	1	50 g, HDPE or PP	Long-term archive	-80
	1	50 g, Teflon	Time trends, emerging contaminants, QA/QC	-80

Hold Times

Samples	Hold Time
Sediment: Fixed/Historic sites	40 yrs; after 40 yrs keep only those collected every 5 yrs
Sediment: Random Sites	5 years
All Tissue	40 yrs; after 40 yrs keep only those collected ~every 5 yrs
Extracts	1 year

Monitoring Chemical Degradation

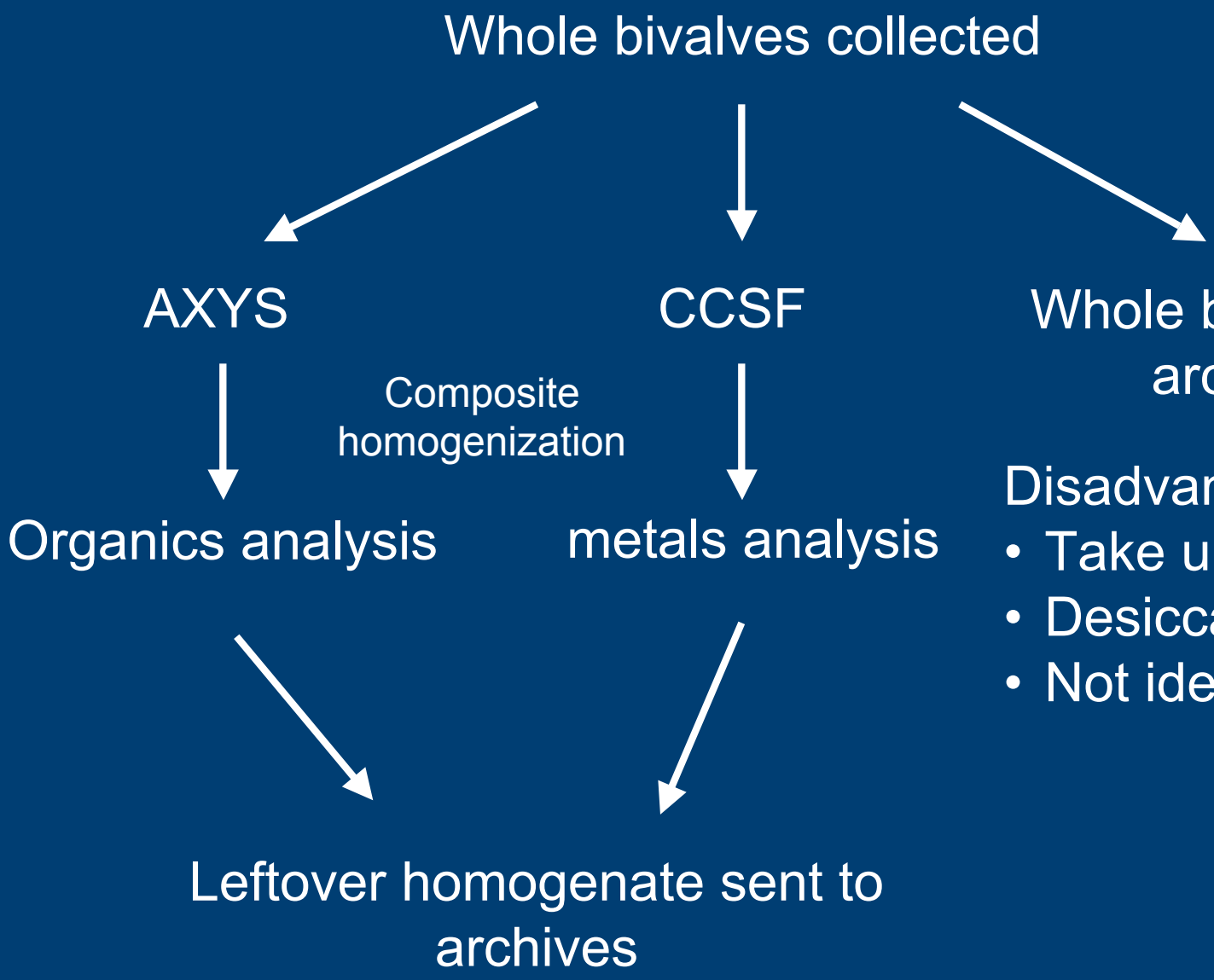
NIST 1974b: fresh frozen mussel tissue (Mytilus edulis)

- 3 replicates analyzed every 4 years
- Coincides with biennial bivalve monitoring
- Same target analytes as analyzed in S&T monitoring
- Kept in storage (-20 and -80 °C) with other RMP samples

Why mussel SRM?

- Mussels frequently analyzed by RMP
- Collected from an urban estuary (Boston Harbor)
- NIST-certified PAHs, PCBs, OC pesticides
- NIST published reports: PBDEs, organotins, musks, MeHg

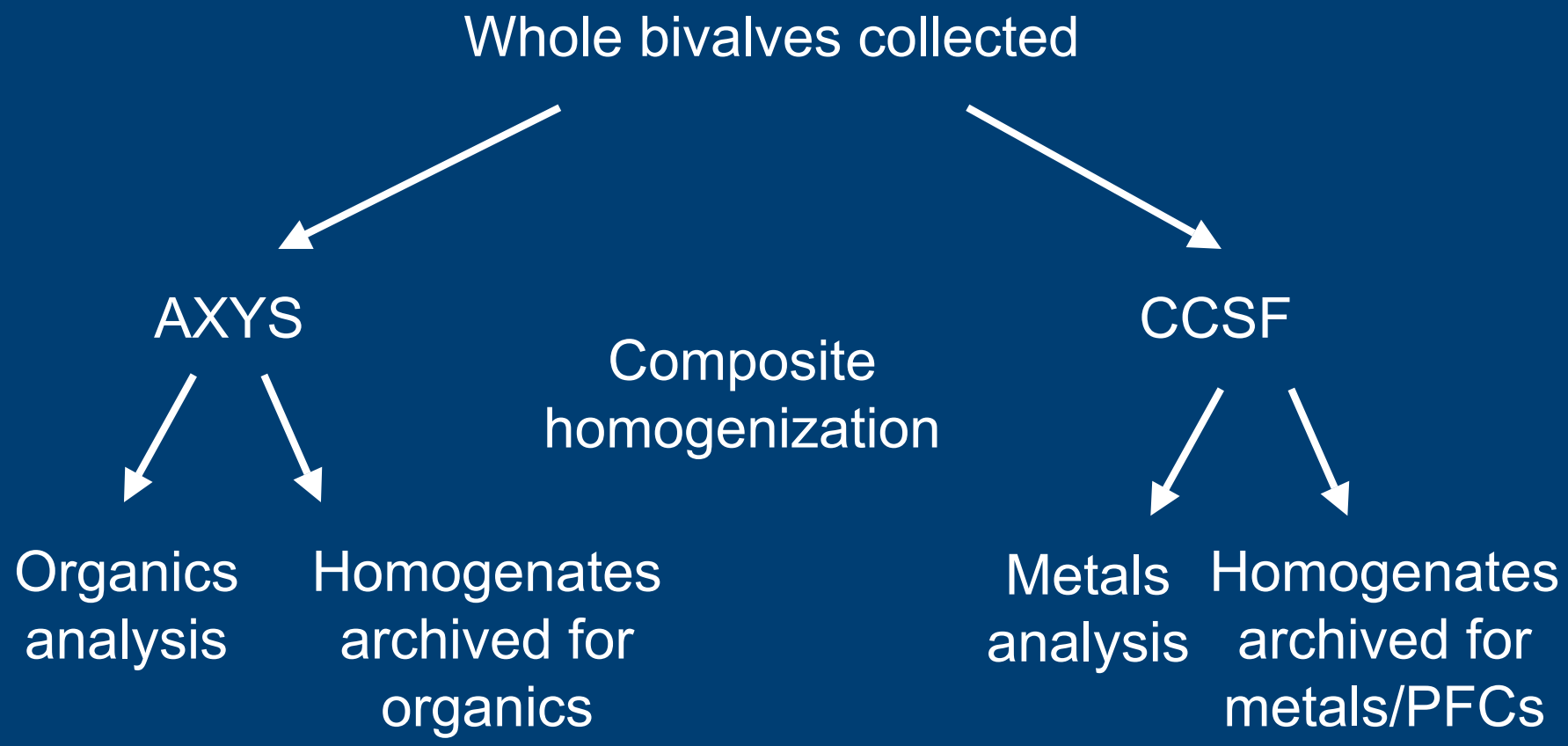
Current Bivalve Procedures



Disadvantages:

- Take up more space
- Desiccation?
- Not ideal for QAQC

Potential Changes to Bivalve Procedures



Disadvantage: Unknown chemicals in homogenization process

Low Temperature (≤ -80 °C) Storage Options

Purchase freezers for storage at SFEI
- Major disadvantages: space, maintenance, The Big One

Commercial facility
- $1200/month for 21 ft^3 of space, plus other service fees
- 477 ft^3 of samples estimated on-hand (100 coolers)
- Inventory increases each year

Rent space from another agency?
- NIST, USGS, CA DTSC, SCCWRP?

Partner with another agency and share costs?
- SCCWRP, others?

Low cost alternative: compromise ‘ideal’ storage conditions?

Issues to Address

1. Prioritization when less than ideal amount of tissue available for archiving
2. Bivalve procedures
3. Feedback on other procedures
4. Further prioritization of samples for -80 °C storage?

Current Inventory of RMP Samples

Media	# coolers	# barrels	Est Vol (cf)
bivalve	31		93
sediment	40		120
water extracts	2		6
fish	9		27
Risebrough	21		63
CEP cores		4	168
TOTAL			477

cooler vol, est (cf)	3
barrel vol, est (cf)	42

-20 °C offsite commercial freezer

Disadvantages

- Preservation is uncertain
- Sample control