Preliminary Sampling Design for Validation of Operational Chlorophyll Product

Issue:

- Collection of in-situ observations not designed for validation of operational satellite-derived ocean biology products

Task:

- Design a survey to collect in-situ water samples in the Gulf of Maine that will maximize precision of the validated chlorophyll estimates while minimizing cost

Recommendations*:

- Stratify Gulf of Maine by region and depth
- Use Optimal Allocation to minimize cost while maximizing precision
- Employ Systematic Sampling within strata

Future Plans:

- Examine assumptions used and modify sampling plan and formulation accordingly
- Apply to other regions and operational products

Scenario 1: Estimating the precision that can be achieved w

Total variable cost available:	$500,000.00				
Expected level of precision:	0.02051				
Constant of proportionality (K):	0.01307				
Total sample size:	836				
Overall element variance:	29.2897				
Design Effect:	0.5867				

Stratum (h)	Population Total (N_h)	Weight (W_h)	Average Squared Difference	Element Standard Deviation (S_h)	Cost per Sample (c_h)
1. Banks	52,382.0	0.1389	0.3787	0.3594	$2,260.00
2. Open Ocean	191,173.0	0.5068	0.4145	2.1341	$2,260.00
3. Costal Water	133,650.0	0.3543	1.5926	7.4350	$326.67
total	377,205.0		0.8608		

Scenario 2: Calculating the total variable cost required t

Desired level of precision:	0.05				
Total variable cost required:	$205,419.82				
Constant of proportionality (K):	0.00537				
Total sample size:	343				
Overall element variance:	29.2897				
Design Effect:	0.5869				

Stratum (h)	Population Total (N_h)	Weight (W_h)	Average Squared Difference	Element Standard Deviation (S_h)	Cost per Sample (c_h)
1. Banks	52,382.0	0.1389	0.3787	0.3594	$2,260.00
2. Open Ocean	191,173.0	0.5068	0.4145	2.1341	$2,260.00
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Formulation to estimate the precision expected for a specified amount of funding (top frame) and the cost required to achieve a specified precision (bottom frame) for validating satellite-derived chlorophyll concentration in the Gulf of Maine. Optimal stratum sample size is also calculated.

Survey Design Course, Joint Program in Survey Methodology, UMCP