Questions to Consider for Next Week

1. How does increasing the number of tows influence the accuracy and the precision of the results?
   * Consider the trade-offs between the number of tows and accuracy and precision of the survey results with logistical constraints of running a survey
2. When you have few survey stations (e.g. ≈20) why are the stratified survey biomass estimates generally biased?
   * *Hint* Look at the number of stations in each of the NAFO stratum (e.g. Figure 5 in …Lecture\_2/Results/Full\_results\_20\_stations\_1\_simulation.docx)
3. How do biological, social, economic, or political factors could influence the design of the survey of the (*D. maximus*) stock (population) in this Region.
   * *Hints*:
     + Biological versus artificial boundaries
     + Canada versus United States
     + Survey occurs during spawning
4. Consider Table 1
   * Which of the 3 sampling methods (Random, NAFO stratification, Depth stratification) would you suggest to use for the survey and why?
5. How many survey stations would you recommend?
   * Consider the ‘constraints’ on your available time in Part “C” of the Tutorial Outline above.

NOTE: The Biomass of the bank is 100,000 tonnes and the biomass is distributed Randomly across the bank for all the simulations

Summary of the Results

Table 1: A Table of the results from the simulations. When a single simulation is performed, the Biomass is the mean, while the Upper and Lower CIs are the 95% confidence interval calculated from the survey. When 200 simulations are run the Upper and Lower CI represents the interquartile range of the 200 simulations (i.e. 25% of the simulations estimated the biomass below the Lower CI and 25% of the simulations estimated the biomass above the Upper CI)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tow Stratification | Biomass | Lower CI | Upper CI | Number of Stations | Number of Simulations |  |
| Random | 104000 | 98380 | 109600 | 1000 | 1 |  |
| Random | 102400 | 94280 | 110500 | 200 | 1 |  |
| Random | 94520 | 73490 | 115500 | 20 | 1 |
|  |  |  |  |  |  |  |
| NAFO Strata | 105500 | 102000 | 109000 | 1000 | 1 |  |
| NAFO Strata | 101500 | 96400 | 106600 | 200 | 1 |  |
| NAFO Strata | 97540 | 71130 | 123900 | 20 | 1 |
|  |  |  |  |  |  |  |
| Depth Strata | 102400 | 97220 | 107700 | 1000 | 1 |  |
| Depth Strata | 97440 | 91570 | 103300 | 200 | 1 |  |
| Depth Strata | 110700 | 87780 | 133500 | 20 | 1 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| **200 Simulations** |  |  |  |  |  |
| Random | 103200 | 101300 | 104800 | 1000 | 200 |
| Random | 103400 | 99990 | 107500 | 200 | 200 |
| Random | 105000 | 93020 | 115600 | 20 | 200 |
|  |  |  |  |  |  |
| NAFO Strata | 103200 | 102200 | 104300 | 1000 | 200 |
| NAFO Strata | 103500 | 100900 | 105900 | 200 | 200 |
| NAFO Strata | 99260 | 90820 | 106900 | 20 | 200 |
|  |  |  |  |  |  |
| Depth Strata | 103200 | 101500 | 104600 | 1000 | 200 |
| Depth Strata | 103400 | 100400 | 106700 | 200 | 200 |
| Depth Strata | 106100 | 93840 | 117300 | 20 | 200 |
|  |  |  |  |  |  |
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