SRS- simple random sampling

STRS- stratified random sampling, increases control and improves efficiency

* Precision of ST estimators depends the variances within strata, i.e., how homogeneous the strata are with respect to the parameter of interest. If the within stratum variances are smaller than the overall population variance, then STRS sampling will be more efficient than SRS.
* Sample allocation
  + Equal
  + Proportional
  + Optimum- requires good *a priori*  estimates of stratum variances
* Sample more in a stratum if it is:
  + Larger
  + More variable
  + Cheaper

Cluster sampling

* Population units are partitioned into *k* primary units (clusters), each of which contains a number of secondary units
* Selection protocol
  + A random sample of *n* primary units is selected
  + All secondary units within selected primary units are sampled
  + The primary units can be selected with equal probability (SRS) or with probability proportional to size (PPS) if size is known.

Why Use Cluster Sampling?

* Logistics, cost
  + Increased cost efficiency gained from sampling fewer, more spatially concentrated areas
* Increased statistical precision IF:
  + the primary clusters are representative of the population as a whole, i.e., the secondary units capture the diversity of the entire population
  + cluster means are similar

Indexing populations

* Direct, incomplete count, e.g.,
  + Salamanders per pitfall trap
  + Pheasant broods per roadside route
  + Electrofishing
* Indirect indicator, e.g.,
  + Predator tracks at scent stations
  + Deer pellet counts
  + Prairie dog burrows
  + Catch per unit effort
* Problems with indices
  + Assumes constant detection probability across habitat types, observers
  + [Index] = [Population size]\*[average probability of detection]
  + Changes in populations are potentially confounded by different detectability
  + Probability of detection influenced by behavior, habitat, season, traps/gear ect.

Questions from Harr

1. Describe your relevant experience and how it has prepared you for the position.
   1. Two parts-
      1. Experience- Combination of academic training and practical agency experience. As part of academic training I have taken a number of courses on statistical analysis, experimental design, ecological statistics, and population modeling. I have also assisted in teaching courses in quantitative field ecology with Dr. Otis. Additionally my PhD. Research has allowed me to develop ecosystem and systems modeling skills that I can couple with statistical knowledge.
      2. Preparation- As a student contractor with the USEPA
2. Describe a project you have been a part of that went poorly. Why did it do so? What corrective actions did you take?
   1. Project that went poorly- Master’s research which was to develop a risk model of WD
   2. Why- project personnel and PI did not possess skills necessary to meet project objectives. Personnel interests did not align with objectives.
   3. What did you do: developed skills needed to do project work, revisiting analysis and integrating into a systems model that should reach objectives. Critically evaluate team skills and objectives.
3. Describe your preferred communication style and why. Describe a situation where your preferred style did not work effectively, and the tools/mechanisms you used to effectively communicate with an individual who may have been difficult to communicate with, i.e., use it as a learning experience to prevent similar situations in the future.
   1. Oral- The English language is an aural language so oral communication is inherently easier. Conversations with stakeholders are easy to engage and as long as you talk to them respectfully and clearly communicate your intentions things can be quite rapid.
   2. Landowners in Pahsimeroi- Landowners are wary of State, Federal, and conservation agencies. Access to private property was limited by this uneasy litigious environment. In this case a short letter clearly stating our objectives, our intentions (research not enforcement), and willingness to share what we found was more useful to have something in writing than orally.
4. How would you deal with conflict between members of the research team? What actions would you take if you know a team member or other DNR employee was violating DNR policies or rules?
   1. Subordinate- deal appropriately by following chain of command. I have found that it has been best to do must things in writing.
   2. Non-subordinate: Talk with supervisor and make them aware of situation.
5. Please describe two examples of tangible success stories in the most recent 5 years of your career that you have been part of and what was your role in them?
   1. Malheur system model: Clay and I brought into talk about Clear Lake Project as part of a 3 day get together on managing common carp populations in Malheur NWR. As part of the discussion and proposed actions, I synthesized information into a conceptual and quantitative systems model that was presented to the group at the end of session. As part of that I received feedback from a rancher and interested party that were very pleased with the model and that it makes sense and was explained in a way that makes sense. “I am a luddite and that made sense to me.”
   2. Clear Lake Carp harvest: As part of my dissertation research I have been synthesizing data collected on Clear Lake that can be used to manage carp harvests. In an analysis I just finished up fit a new pulse biomass dynamics model to the data that coupled monitoring data (trawling) that can be used to estimate biomass from trawling data. The successful part of this research was that I found that the biomass doubling time was approximately 2.75 years and so by using a combination of trawling to monitoring the population and period mark recaptures estimates every 3rd year we could minimize effort and man hours required and maintain an informed management process.
6. What talents, strengths, and skills do you bring and how would they benefit the IADNR? In short why should we hire you?
   1. Economics- IADNR as with most are facing shrinking budgets and needs to get as much information from existing data and from future data collections with budgetary constraints
      1. Simulation- extensive simulation expertise that can be used to screen new monitoring programs, ect.
      2. Simulation with statistical analysis- extract as much from existing data to inform continued sampling, for example it may be reasonable to reduce sampling based on level of certainty required for management
      3. Systems approach and optimization- internal DNR programs cost money (e.g., hatchery operations), I can evaluate internal systems, best example would be to build a systems model of hatchery operations and use the model to optimize return to creel and minimize cost. Similarly, could look at areas on a landscape to optimize placement of conservation areas that maximize an objective function while trying to minimize cost.
   2. R (R is free): already taught a course to DNR Fisheries, could do same for wildlife, create useful functions that integrate with existing databases so that managers can just run a bit of code to get analyses, and updates as needed
   3. I already do numerical analysis on a day to day basis, I have spent the past 10 years developing skills to be able to analyze imperfect data (such as that found in natural resource data). In short I have grown into a quantitative niche, that has been awarded (recent USEPA) and I think that this position would be a good fit for my unique expertise.
7. If offered, will you accept the position? When would you be willing to start?