NR421 - NATURAL RESOURCE SAMPLING

Final Exam

Spring 2002 **Name**_____

Total points 80.

(15 pts) 1. Define the following terms:

a. Primary sampling unit -

b. Double sampling -

c. Stocked quadrat -

d. Line transect sampling -

e. Density -

(9 pts) 2. True-False

_____ To estimate a change in a population from one occasion to the next it is best to retain the same sample throughout all occasions.

_____ Two-stage cluster sampling eliminates the need to sample all elements in each sampled cluster. Thus the cost of sampling can often be reduced with little loss of information.

_____ Direct sampling can be used to estimate the size of a mobile population.

(20 pts) 3. In a capture-recapture survey, 10,000 salmon were released after marking by inserting small wires. When 6000 fish from the population were subsequently caught, 400 of the wire tags were discovered by running the fish through a metal detector.

a. Estimate the number of fish in the population and place a bound on the error of estimation.

b. Suppose that the detection device missed some of the wire tags. Would this result in overestimation or underestimation of the population total? Why?

c. If the wire tags caused significant number of fish to die soon after release, would overestimation or underestimation tend to result? Why?

(5 pts) 4. Discuss the differences between direct and inverse sampling.

(15 pts) 5. A zoologist wishes to estimate the size of the turtle population in a given area. She believes that the turtle population is between 500 and 1000, hence, an initial sample of 100 (10%) appears to be sufficient. The t=100 turtle are caught, tagged and released. A second sampling is begun one month later , and she decides to continue sampling until s=15 tagged turtles are recaptured. She captures 160 turtles before obtaining 15 tagged turtles (n=160, s=15). Estimate N and place a bound on the error of estimation.

(15 pts) 6. Suppose that you need to estimate the forest acreage and total board-foot volume for a forest covering 1000 acres. You have 2000 aerial photographs available to help stratify the population into three strata. In the second phase n=100 sample plots are allocated to the strata to estimate board-foot volumes. The results of the survey are as follows:

Stratum	No. Photo Plots	No. Sample Plots	Sample Distribution			Avg. Vol./ Acre
			Pine	Hrdwd	Pine-Hrdwd	
Pine	1000	60	50	8	2	15,000
Hrdwd	600	20	3	16	1	10,000
Pine-Hrdwd	400	20	6	4	10	2,000
Total	2000	100	59	28	13	

a. Estimate the total board-foot volume.

b. Estimate the number of acres of pine.

c. Estimate the number of acres of pine-hardwood.