population. The percentage of adults ovulating in this population was very comparable to other moose populations. The low observed production of twins may be related to low percentages of multiple ovulations among adults. Examinations of 28 uteri from adult moose showed that 25 (89%) were pregnant. Data suggested that only 4-5 percent of the yearling females became pregnant. Field observations of 705 calves showed a five percent twin birth rate. Information from this and other studies suggested that a long term decrease in percentages of twins has occurred in the Jackson Hole area. These findings were discussed in relation to nutritional stresses. An expected calf per 100 female ratio of 70 was calculated from pregnancy rate and age structure data. The magnitude of annual differences between observed and expected ratios paralleled differences in winter severity and were attributed to calf mortality which occurred at or immediately following parturition. Calculations suggested that over-winter calf survival to the yearling age class has varied from probably complete to less than 50 percent survival.

Examinations of 586 jaws from hunter killed moose suggested that males were subjected to a greater harvest rate than females, which resulted in an over-all younger age structure for males. The percentages of yearling males in fall harvests have shown significant annual fluctuations. One major factor determining these values has been winter calf mortality. The over-all age composition of the harvest resembled the age structure of a relatively stable population. A comparison of the age structure of this population with others suggested that increased exploitation was possible. Hunter harvests, accidents, illegal kills and crippling losses annually removed about 300 animals from the Northern Jackson Hole area. Calculations showed that a base winter herd of 1,800 animals was necessary to sustain an annual removal of 300 animals and a 20 percent annual over-winter calf mortality.

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Analysis of the Insect Fauna of the Snake River

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Project Number 132

Five Surber foot-square samples were taken at two week intervals at four different sampling stations throughout the summer. The contents of these samples were taken back to the research laboratory where the organisms were identified, counted and weighed. Emerging adult insects were captured at the sampling stations by taking 50 sweep samples in the vegetation along the river. Eight emergence traps were used to capture adult insects from the river at the Station. The river water was analyzed for oxygen, alkalinity, carbon dioxide and hydrogen ion concentration at monthly intervals at the sampling stations.

Hourly drift samples of stream insects were taken during four 24 hour periods. The data collected shows that very few insects drift during the daylight hours, but when it becomes dark many insects drift with the current. As many as 1000 insects were collected during hourly night samples, but during the day only about 20 insects per hour would be collected from the drift net.

On October 28, 1966 a special trip was made to the Research Station to get a measure of the detrimental effects caused by a rapid decline in the volume-flow in the Snake River. Foot-square samples were taken from the newly exposed stream channel and it appears that all the insects were left stranded. Three yard-square quadrats of stream channel were examined to determine the number of sculpins that were stranded on the exposed stream channel. An average of 18 sculpins were left stranded per square yard. This information shows that the unnatural fluctuating water levels are extremely detrimental to the river's ecology, and the depletion of the food organisms must surely have a detrimental effect on the higher trophic levels in the food chain.

This study of the Snake River has the following objectives: (1) to make a complete species list of all the invertebrates found in the river, (2) to determine the life histories of as many of the species as possible, and (3) to determine the effects on the aquatic organisms when the volume-flow is decreased rapidly. Much of this information has already been learned and more will be discovered when all the samples have been quantitatively analyzed.

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Stress and Parasitism

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Project Number 103

Studies on stress and parasitism during the summer of 1966 were confined to rechecking some of the results of 1965 and to adding information on the volume of cecal contents as indicated by their weight. The main purpose was to try to eliminate some of the variables which are inherent in a project of this sort. Practically all of the laboratory work was done during July.

Twenty ground squirrels (Citellus armatus) were collected and examined immediately for protozoa, following the hemacytometer counting technique of last summer. These field controls contained, on the average, 2866 amebas per ml of cecal contents. Last year 40 field controls yielded 3417 amebas/ml. Twenty animals were cold-stressed by the absence of bedding and the addition of ice to their cages each night for three consecutive nights. The average ameba count rose to 5387. Last year the figure for 50 cold-stressed squirrels was 5348, a remarkably similar number. Twenty animals kept in cages with bedding and heated at night (caged controls) had about the same number of amebas as did the stressed animals. This result was comparable to that of last year with 10 caged controls and clearly indicates that caging alone is a highly significant stress factor.

Since the volume of cecal contents might influence the numbers of amebas, all ceca were weighed when removed from an animal and weighed again when the contents were washed out. The weights of the cecal contents were considered to be a reliable indication of their volume. There was found to be no correlation between the weight of cecal contents and the numbers of amebas per ml. An examination of the records of all 170 animals captured during 1965 and 1966 showed no correlation between the weight of a squirrel and the average number of amebas per ml of cecal contents in any of the three groups--field controls, caged controls or cold-stressed.