APPENDIX 1: INEL VEGETATION STUDIES

A. Publications and reports based on data from the permanent plots of the long-term vegetation transects at the Idaho National Engineering Laboratory.

Anderson, J.E. 1986. Development and structure of sagebrush steppe plant communities. Pages 10-12 *in* P. J. Joss, P. W. Lynch and O. B. Williams, editors. Rangelands: a resource under siege. Proceedings of the Second International Rangeland Congress. Australian Academy of Science, Canberra.

Thirty-three years of vegetation data on the permanent vegetation plots were examined for trends in species composition. Cover of grasses and shrubs fluctuated, indicating that change was non-directional and stochastic, rather than converging on a climax structure.

Anderson, J.E., and K.E. Holte. 1981. Vegetation development over 25 years without grazing on sagebrush-dominated rangeland in southeastern Idaho. Journal of Range Management 34:25-29.

Data from the permanent vegetation transects were analyzed to determine what changes had taken place in the vegetation complex over the previous 25 years in the absence of livestock grazing. Cover of shrubs and perennial grasses had nearly doubled. No evidence for seral replacement was found.

Anderson, J.E., and R. Inouye. 1988. Long-term dynamics of vegetation in a sagebrush steppe of southeastern Idaho. Final Report, Ecology and Radioecology Program, Idaho Operations Office, U.S. Department of Energy, Idaho Falls, Idaho.

This report describes the dynamics of vegetation over 35 years on a subset of the permanent vegetation plots. The results suggest that shrub cover may fluctuate by as much as 100% and grass cover by as much as 500% within a decade. Changes in the cover of Bromus tectorum *are also described.*

Anderson, J.E., R.J. Jeppson, R.J. Wilkosz, G.M. Marlette, and K.E. Holte. 1978. Trends in vegetation development on the Idaho National Engineering Laboratory Site. Pages 144-166 *in* O.D. Markham, editor. Ecological Studies on the Idaho National Engineering Laboratory Site -- 1978 Progress Report. Radiological and Environmental Sciences Laboratory, U.S. Department of Energy, Idaho Falls, Idaho.

Data collected in 1975 from the permanent vegetation transects were analyzed to determine what changes had occurred in the vegetation complex over the previous 25 years and to compare trends in vegetal composition between grazed and non-grazed areas. This report includes details of the original sampling design.

Harniss, R.O. 1968. Vegetational changes following livestock exclusion on the National Reactor Testing Station, southeastern Idaho. Thesis. Utah State University, Logan, Utah.

Analysis of vegetation change following livestock exclusion in 1950 was the major objective of this study. The author concluded that there was little change that could not be attributed to the influence of precipitation and that "natural revegetation is slow."

Harniss, R.O., and N.E. West. 1973a. Changes in *Artemisia tridentata/Sitanion hystrix* vegetation on the National Reactor Testing Station, southeastern Idaho. 1950 - 1965. Utah Academy Of Sciences, Arts, and Letters Proceedings 50:10-16.

Most of the increase in grass cover at the INEL during the period 1950 - 1965 was due to an increase in the cover of bottlebrush squirreltail (Sitanion hystrix = Elymus elymoides), *which was designated as a climax species for large portions of the INEL.*

Harniss, R.O., and N.E. West. 1973b. Vegetation patterns of the National Reactor Testing Station, southeastern Idaho. Northwest Science 47:30-43.

Twelve vegetation types for the INEL are described and depicted on a map.

B. Other recent vegetation studies at the Idaho National Engineering Laboratory.

Anderson, J.E. 1991. Vegetation studies to support the NPR Environmental Impact Statement. Final Report to EG&G, Idaho, Inc., Idaho Falls, Idaho.

This report describes sampling and analyses associated with development of the INEL vegetation map and classification of plant communities.

Anderson, J.E., and G.M. Marlette. 1986. Probabilities of seedling recruitment and the stability of crested wheatgrass stands. Pages 97-105 *in* K. L. Johnson, editor. Crested wheatgrass: its values, problems, and myths; symposium proceedings. Utah State University, Logan, Utah.

Data on seedling emergence from undisturbed topsoil samples show that there is a paucity of native propagules within crested wheatgrass stands. Recruitment probabilities favor the maintenance of a monoculture rather than its successional replacement.

Anderson, J.E., and M.L. Shumar. 1986. Impacts of back-tailed jackrabbits at peak population densities on sagebrush-steppe vegetation. Journal of Range Management 39:152-156.

Jackrabbit exclosures were constructed in different vegetation types. Plant cover inside and outside the exclosures was estimated in 1979 and 1982. Jackrabbit populations peaked in 1981. Plant cover was significantly reduced outside the exclosures, but relative cover of species was similar. Shrubs were browsed heavily during the winter, but showed compensatory growth in the spring. The results indicated that a peak in jackrabbit populations has little impact on the structure of these plant communities.

Cole, N.K. 1987. The growth and water relations of *Leymus cinereus* following a prescribed burn. M.S. Thesis, Idaho State University, Pocatello, Idaho.

Plant density, basal area, cover and biomass of Leymus cinereus *were measured in burned and unburned stands. Plant phenological parameters and soil water content were also estimated. Although there was some mortality of small individuals, in general* L. cinereus *plants responded vigorously to burning. Tillers emerged earlier and plants were greener and taller on the burned site. Lower soil moisture content on the burn site resulted in significantly lower plant water potentials on the burned site for most of the growing season. Nevertheless, basal cover on the burned site was similar to that of the control site at the end of the first postfire growing season.*

Floyd, D.A. 1982. A comparison of three methods for estimating vegetal cover in sagebrush steppe communities. M.S. Thesis, Idaho State University, Pocatello.

This thesis includes three chapters: 1) pre-burn characterization of vegetation on a prescribed burn site, 2) description of a new point interception frame for estimating vegetal cover, and 3) comparison

of cover estimates, precision, and sampling efforts for line interception, point interception, and cover-class estimation in sagebrush steppe.

Floyd, D.A., and J.E. Anderson. 1982. A new point interception frame for estimating cover of vegetation. Vegetatio 50:185-186.

This paper describes construction and use of a simple, widely applicable point sighting frame that is used for estimating cover of plants or other entities in a community.

Floyd, D.A., and J.E. Anderson. 1983. Baseline vegetation data for a controlled burn site. Pages 182-197 *in* O.D. Markham, editor. Idaho National Engineering Laboratory Radioecology and Ecology Programs 1983 progress report. DOE/ID-12098. National Technical Information Service, Springfield, Virginia.

An area was selected to study the response of vegetation to a prescribed burn at the INEL. Vegetal cover was estimated by point interception.

Floyd, D.A., and J.E. Anderson. 1987. A comparison of three methods for estimating plant cover. Journal of Ecology 75:221-228.

This study compared cover estimates, precision, and sampling efforts for line interception, point interception, and cover-class estimation in sagebrush steppe.

French, N.R., and J.E. Mitchell. 1983. Long-term vegetation changes in permanent quadrats at the Idaho National Engineering Laboratory Site. Bulletin No. 36, University of Idaho Forest, Wildlife and Range Experimental Station, Moscow, Idaho.

In 1975 and 1976, the authors examined 16 permanent quadrats that had been established between 1955 and 1957. These plots were established to sample some vegetation types not sampled by the two main vegetation transects (see Appendix 1, Part A). The authors concluded that "Vegetation dynamics of shrub-dominated communities of the area are complex events resulting from both long-term successional trends following disturbances . . . and short-term fluctuations due primarily to changing seasonal weather patterns." They also found that "Shrub populations are relatively stable regardless of perturbations caused by climate or livestock grazing. It is the understory herbaceous species which respond most to disturbances, and . . . account for a majority of the vegetation dynamics in succession and fluctuations."

Marlette, G.M. 1982. Stability and succession in crested wheatgrass seedings on the Idaho National Engineering Laboratory Site. M.S. Thesis, Idaho State University, Pocatello.

Study sites were established in crested wheatgrass stands that were more than 20 years old. Analysis of seed reserves and vegetation cover in the crested wheatgrass sites and in adjacent communities of native species showed that vegetal cover of dominant species was positively correlated with their seed reserves. Seed banks in crested wheatgrass stands were heavily dominated by crested wheatgrass seeds.

Marlette, G.M., and J.E. Anderson. 1986. Seed banks and propagule dispersal in crested wheatgrass stands. Journal of Applied Ecology 23:161-175.

Areas sown with crested wheatgrass were compared with adjacent native plant communities for plant cover and seed bank composition. Propagules of native species in the seeded areas were sparse, indicating that stand stability may be a consequence of dominance of the seed bank by crested wheatgrass, rather than direct competition for resources.

Pearson, L.C., and S.K. Rope. 1987 Lichens of the Idaho National Engineering Laboratory. DOE/ID-12110. U.S. Department of Energy, Idaho Operations Office, Idaho Falls, Idaho.

This report lists 111 lichen taxa that occur at the INEL. A key to the lichen species and a general description of the genera are included.

Shumar, M.L. 1983a. Factors affecting the distributions of two subspecies of big sagebrush. Pages 172-181 *in* O.D. Markham, editor. Idaho National Engineering Laboratory Radioecology and Ecology Programs 1983 progress report. DOE/ID-12098. National Technical Information Service, Springfield, Virginia.

The study examined the relationships between distributions and habitat characteristics for two subspecies of Artemisia tridentata*, ssp.* wyomingensis *and ssp.* tridentata*. Distributions of the two subspecies were related to a gradient of soil texture.*

Shumar, M.L. 1983b. Sagebrush distributions on the Idaho National Engineering Laboratory. Pages 157-161 *in* O. D. Markham, editor. Idaho National Engineering Laboratory Radioecology and Ecology Programs 1983 progress report. DOE/ID-12098. National Technical Information Service, Springfield, Virginia.

Sagebrush samples were collected within 25 m of roads and trails on the INEL. Samples were identified to species and subspecies using morphological characteristics and ultraviolet spectrophotometry. Three species of Artemisia *and two subspecies of* A. tridentata *were identified. A map of the distribution of these species and subspecies is included.*

Shumar, M.L., and J.E. Anderson. 1986a. Gradient analysis of vegetation dominated by two subspecies of big sagebrush. Journal of Range Management 39:156-160.

Vegetal cover and soil parameters were analyzed for areas having pure and mixed stands of Artemisia tridentata *ssp.* tridentata *and ssp.* wyomingensis*. Distributions of the subspecies were associated with soil texture.*

Shumar, M.L., and J.E. Anderson. 1986b. Water relations of two subspecies of big sagebrush on sand dunes in southeastern Idaho. Northwest Science 60:179-185.

This study compared plant and soil water potentials among dune tops, dune margins, and areas between dunes. Plant water potentials of Artemisia tridentata *ssp.* tridentata *and ssp.* wyomingensis *were different only when soil water potentials associated with each subspecies were also different.*

Sirotnak, J.M. 1990. Intraspecific and interspecific competition in *Leymus cinereus* and *Chrysothamnus nauseosus* in a cold desert community. M.S. Thesis, Idaho State University, Pocatello, Idaho.

Intraspecific competition in Leymus cinereus *and interspecific competition between* L. cinereus *and* Chrysothamnus nauseosus *in a sagebrush steppe were examined through competitor removal experiments.* L. cinereus *had competitive effects on both conspecifics and* C. nauseosus*, but* C. nauseosus *had little effect on* L. cinereus*.*