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Wilderness As a Land Laboratory

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THE recreational value of wilderness has been often and ably presented, but its scientific value is as yet but dimly understood. This is an attempt to set forth the need of wilderness as a base-datum for problems of land-health.

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The most important characteristic of organism is that capacity for internal self-renewal known as health.

There are two organisms in which the unconscious automatic processes of self-renewal have been supplemented by conscious interference and control. One of these is man himself (medicine and public health). The other is land (agriculture and conservation).

The effort to control the health of land has not been very successful. It is now generally understood that when soil loses fertility, or washes away faster than it forms, and when water systems exhibit abnormal floods and shortages, the land is sick.

Other evidences are generally known as facts, but not as symptoms of land-sickness. The disappearance of plant and animal species without visible causes despite efforts to protect them, and the irruption of others as pests, despite efforts to control them, must, in the absence of simpler explanations, be regarded as symptoms of derangement in the land-organism. Both are occurring too frequently to be dismissed as normal evolutionary changes.

The status of thought on these ailments of the land is reflected in the fact that our treatments for them are still prevailingly local.

Thus when a soil loses fertility we pour on fertilizer, or at best alter its tame flora and fauna, without considering the fact that its wild flora and fauna, which built the soil to begin with, may likewise be important to its maintenance. It was recently discovered, for example, that good tobacco crops depend, for some unknown reason, on the pre-conditioning of the soil by wild ragweed. It does not occur to us that such unexpected chains of dependency may have wide prevalence in nature.

When prairie dogs, ground squirrels, or mice increase to pest levels we poison them, but we do not look beyond the animal to find the cause of the irruption. We assume that animal troubles must have animal causes. The latest scientific evidence points to derangements of the *plant* community as the real seat of rodent irruptions, but few or no explorations of this clue are being made.

Many forest plantations are producing one-log or two-log trees on soil which originally grew three-log and four-log trees. Why? Advanced foresters know that the cause probably lies not in the tree, but in the micro-flora of the soil, and that it may take more years to restore the soil flora than it took to destroy it.

Many conservation treatments are obviously superficial. Flood control dams have no relation to the cause of floods. Check dams and terraces do not touch the cause of erosion. Refuges and propagating plants to maintain animals do not explain why the animal fails to maintain itself.

In general, the trend of the evidence indicates that in land, just as in the human body, the symptom may lie in one organ and the cause in another. The practices we now call conservation are, to a large extent, local alleviations of biotic pain. They are necessary, but they must not be confused with cures. The art of land-doctoring is being practiced with vigor, but the science of land-health is a job for the future.

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A science of land health needs, first of all, a base-datum of normality, a picture of how healthy land maintains itself as an organism.

We have two available norms. One is found where land physiology remains largely normal despite centuries of human occupation. I know of only one such place: northeastern Europe. It is not likely that we shall fail to study it.

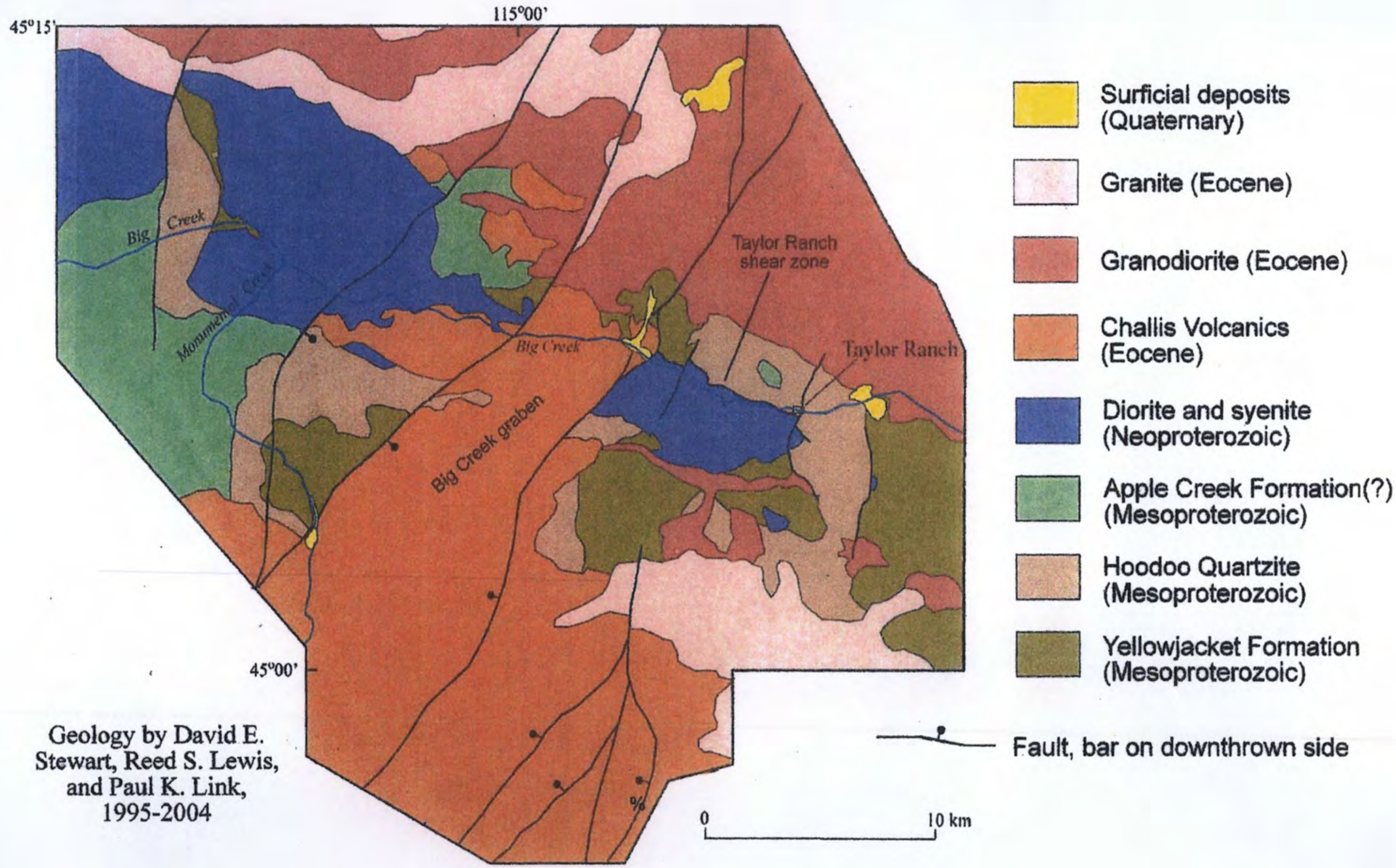
The other and most perfect norm is wilderness. Paleontology offers abundant evidence that wilderness maintained itself for immensely long periods; that its component species were rarely lost, neither did they get out of hand; that weather and water built soil as fast or faster than it was carried away. Wilderness, then, assumes unexpected importance as a land-laboratory.

One cannot study the physiology of Montana in the Amazon; each biotic province needs its own wilderness for comparative studies of used and unused land. It is of course too late to salvage more than a lop-sided system of wilderness remnants, and most of these remnants are far too small to retain their normality. The latest report* from Yellowstone Park, for example, states that cougars and wolves are gone. Grizzlies and mountain sheep are probably going. The irruption of elk following the loss of carnivores has damaged the plant community in a manner comparable to sheep grazing. "Hoofed locusts" are not necessarily tame.

I know of only one wilderness south of the Canadian boundary which retains its full flora and fauna (save only the wild Indian) and which has only one intruded species (the wild horse). It lies on the summit of the Sierra Madre in Chihuahua. Its preservation and study, as a norm for the sick lands on both sides of the border, would be a good neighborly act well worthy of international consideration.

All wilderness areas, no matter how small or imperfect, have a large value to land-science. The important thing is to realize that recreation is not their only or even their principal utility. In fact, the boundary between recreation and science, like the boundaries between park and forest, animal and plant, tame and wild, exists only in the imperfections of the human mind.

*Murie, Adolph. Ecology of the coyote in the Yellowstone. Fauna Series No. 4 of the National Parks of the United States.



Geology by David E. Stewart, Reed S. Lewis, and Paul K. Link, 1995-2004

SAGEBRUSH BENCHES NORTH OF TAYLOR RANCH ON BIG CREEK
SEPTEMBER 2000 FOLLOWING THE FIRE

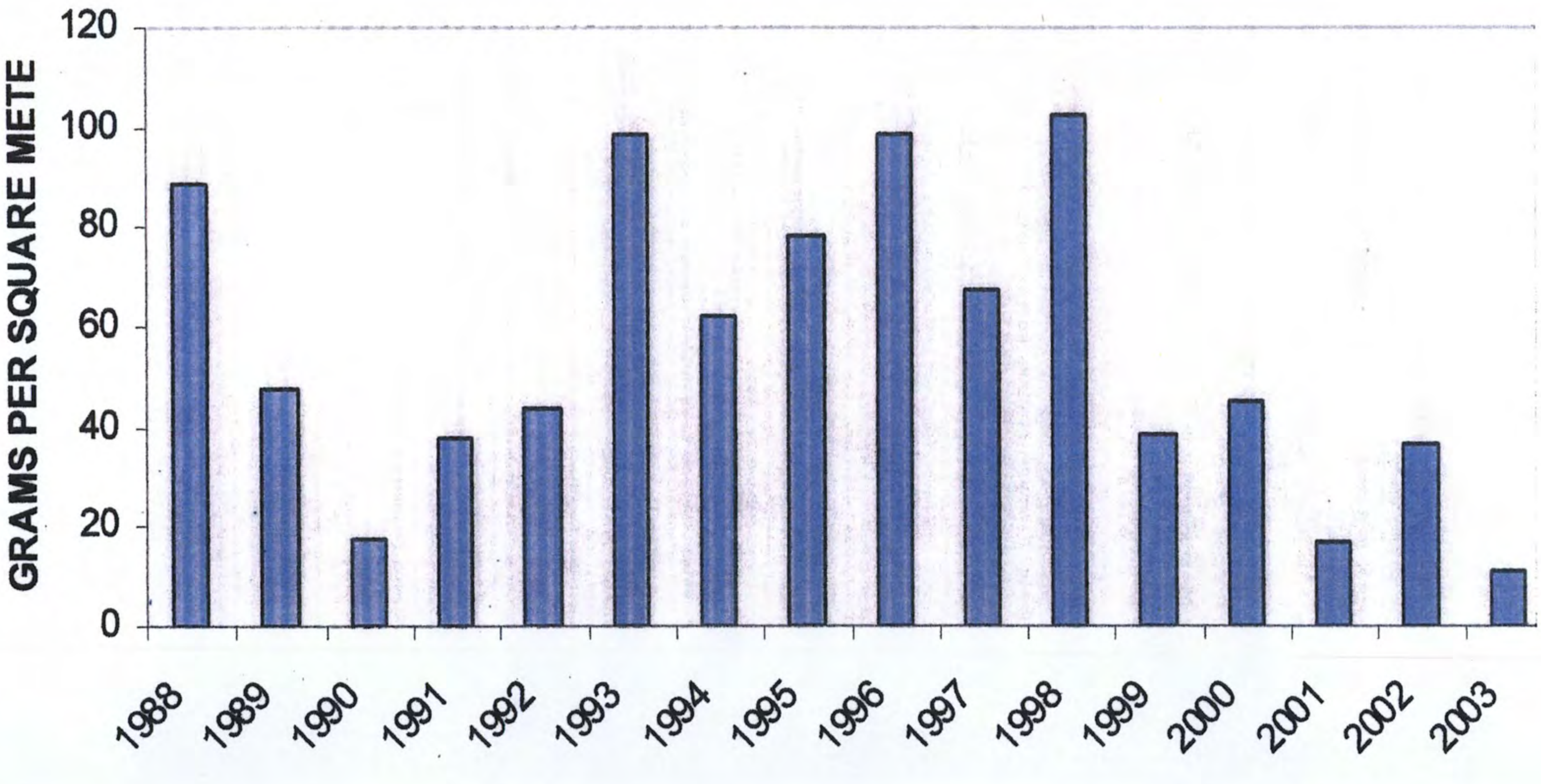
CHANGES IN A BLUEBUNCH WHEATGRASS STAND FOLLOWING THE 2000 FIRE. THIS STAND IS ON THE NORTH SIDE OF CLIFF CREEK NEAR ITS CONFLUENCE WITH BIG CREEK.

WEST BENCH JUNE 1988

WEST BENCH SEPTEMBER 2000, ONE MONTH AFTER THE FIRE

WEST BENCH JUNE 2001, ONE GROWING SEASON LATER

BLUEBUNCH WHEATGRASS PRODUCTION IN A BLUEBUNCH WHEATGRASS/SANDBERG BLUEGRASS COMMUNITY



CHANGES IN A DOUGLAS FIR/ MOUNTAIN MAHOGANY STAND FOLLOWING THE 2000 FIRE. THIS STAND FACES THE AIR STRIP AT TAYLOR RANCH FROM THE SOUTH SIDE.

AIRPORT MOUNTAIN MAHOGANY SITE, JUNE 1988

AIRPORT MAHOGANY, SEPTEMBER 2000, ONE MONTH AFTER THE FIRE

AIRPORT MAHOGANY, JUNE 2001, ONE GROWING SEASON LATER

CHANGES IN A BIG SAGEBRUSH/ NEEDLEGRASS STAND FOLLOWING THE 2000 FIRE. THIS STAND IS ON THE SOUTH SIDE OF RUSH CREEK NEAR ITS CONFLUENCE WITH BIG CREEK.

SAGE BENCH JUNE 1988

SAGE BENCH SEPTEMBER 2000, ONE MONTH AFTER THE FIRE

SAGE BENCH JUNE 2001, ONE GROWING SEASON LATER

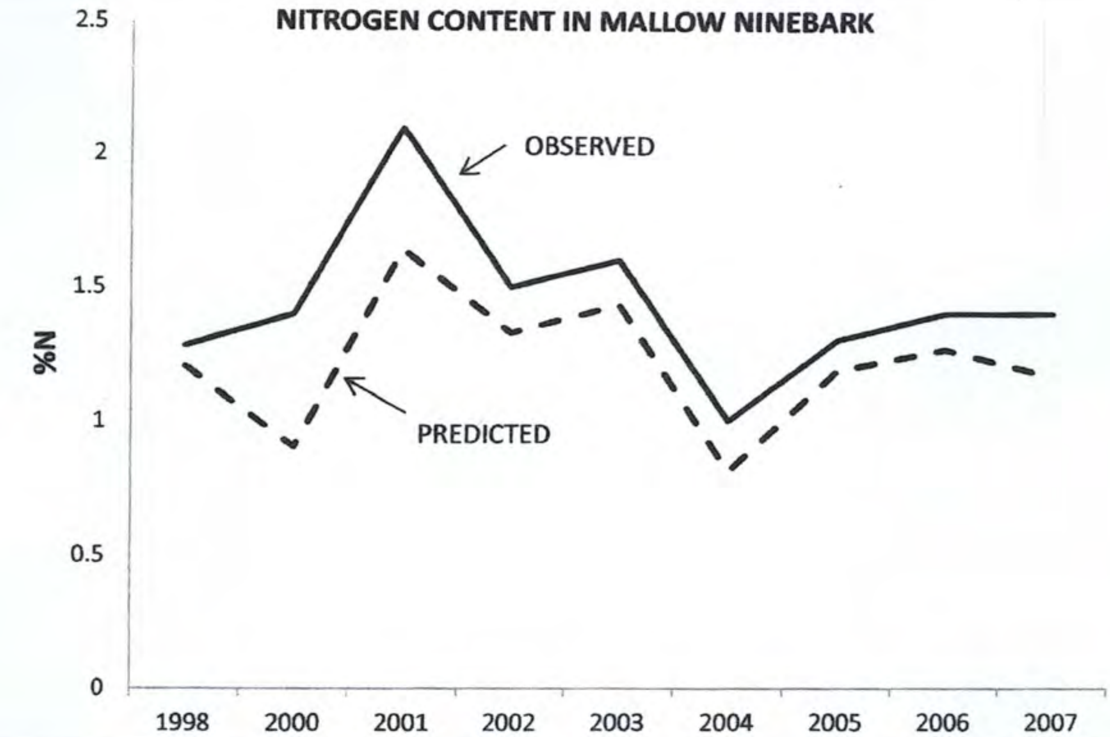
SAGEBRUSH BENCH JUNE 1988

SEPTEMBER 2000, FOLLOWING FIRE

JUNE 2004

PIONEER CREEK
JUNE 1988

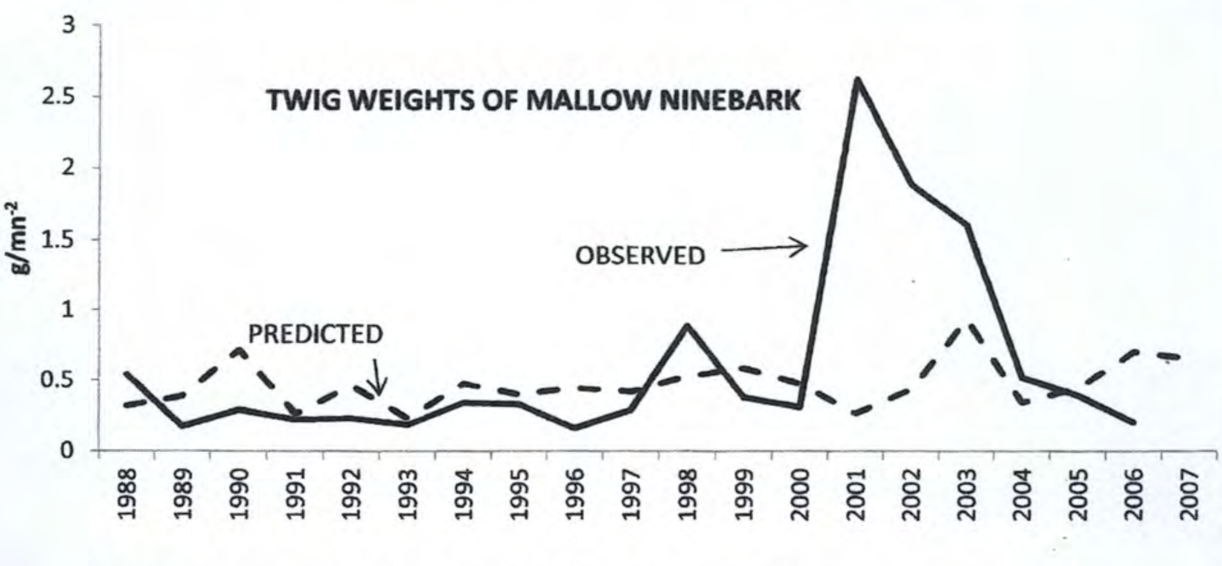
PIONEER CREEK
SEPTEMBER 2000



PIONEER CREEK DATA, NOTE RESPONSE FOLLOWING AUGUST 2000 FIRE.

%N = 2.926-(0.377*APRT)+(0.096*JUNT). F=9.24, P>F= 0.015, R^2= .75

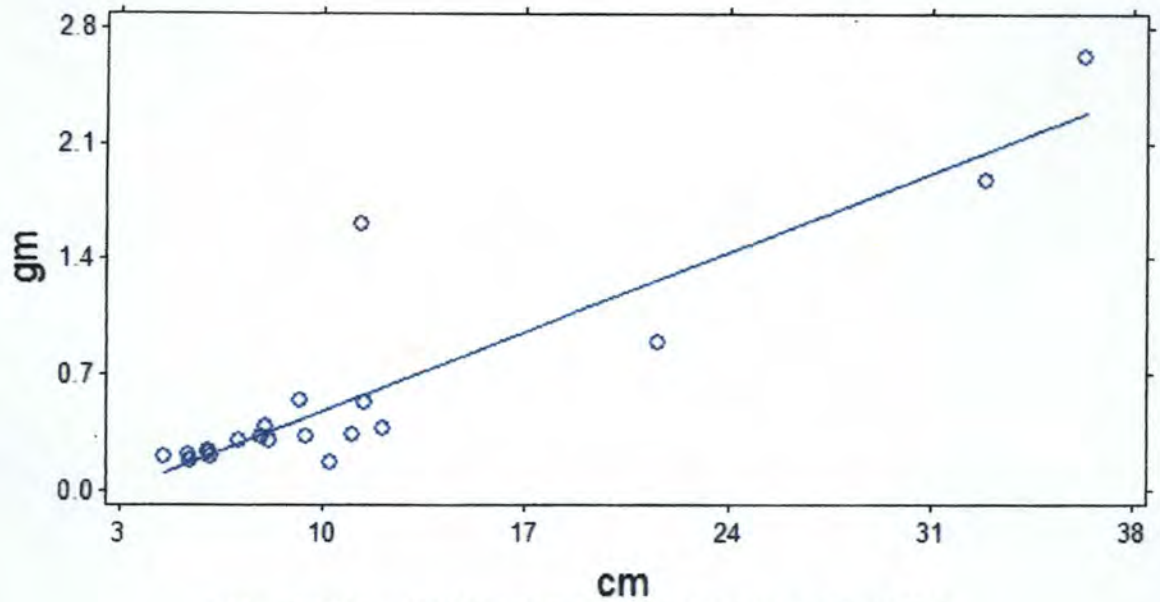
APRT = MEAN APRIL TEMPERATURE AND JUNT- MEAN JUNE TEMPERATURE ©
COOL APRIL TEMPERATURES AND WARM JUNES INCREASE NITROGEN LEVELS.



GM/TWIG = (0.177*JanT) - (0.112 DecP). F=35.21,P>F=.0001.

PIONEER CREEK NINEBARK

WEIGHT ON LENGTH OF CURRENT GROWTH



GM = -0.2060 + (0.0687 * CM). R2= .81. F=77.01. P>F=0.0000

Notes. The relationship of twig length (leaves and stems of current year's growth) to weight is usually readily predicted with linear regression as above. The relationship is specific to each species and site, but can be used over years to get an estimate of productionwithouthaving to collect and weigh twigs every year. The relationship between years likely varies but not enough to prevent using the regression. Usually 50 twigs, randomly selected with no more than 4 or 5 twigs collected or measured per plant, can be used to obtain a mean twig length. Then the regression may be used to estimate the mean dry weight per twig which can then be used to compare between years.

If an estimate of current year's growth is desired for a stand, then twigs will have to be counted in plots, a mean number obtained per meter $^{-2}$ and that number times the mean weight/twig will give an estimate of biomass produced. A $4m^2$ circular plot (1.13 m radius) has proven to be a practical size for this work

This work is time consuming, but since it relies on counts and direct measurements and there is no ocular estimation, it has proven to be reliable. People with minimal training can obtain accurate counts and measurements.

The information obtained from this kind of work has value when quantitative estimates of biomass are needed for studies of the effects of climate change, effects of grazing by ungulates and other species on native plants, relationships of plant productivity to changes in populations of associated fauna.

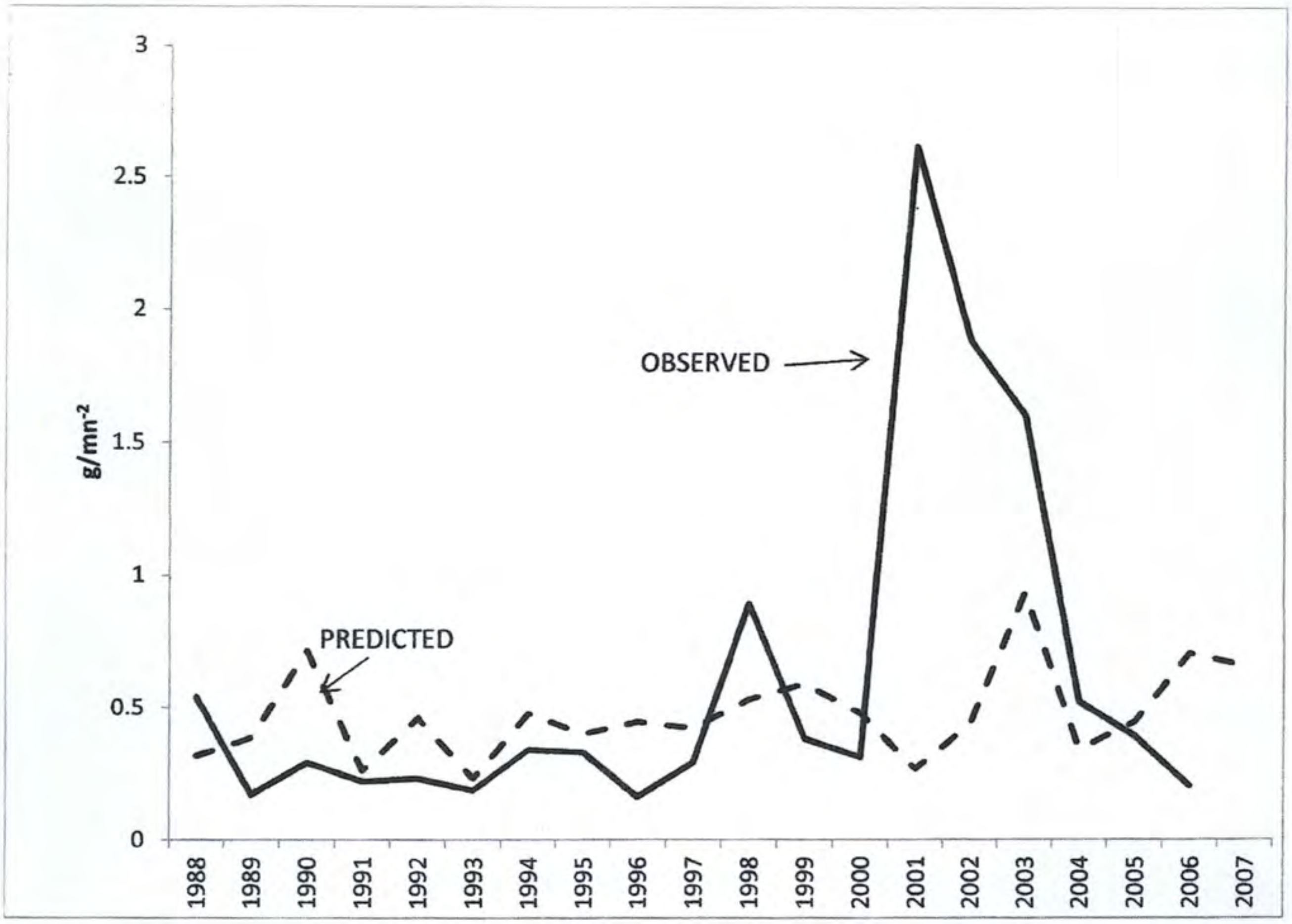


Figure 3. Twig weights of mallow ninebark in Pioneer Creek. . The prediction is: gm/twig = (0.177
F=35.21, P>F=0.0001. JANT= January mean temperature and DECP is total December precipitat
Note response to wildfire on August 2000.