SOIL CONSERVATION IN THE PALOUSE (1930-1938)

My initial contact with the name "Palouse" was during high school in Fremont, Nebraska, in 1906 or 1907. The local Union Pacific Railroad station agent hired me to distribute 30 cardboard posters (each about 3 1/2 by 6 feet) in 30 towns of eastern Nebraska (Fig. 32). My job was to nail the posters inside the waiting rooms of the passenger stations of the Union Pacific Railroad. I was given a rail pass, expenses for meals, and $5 for the job, which took several days (Publication 46).

IMPERIAL PORTLAND & SEATTLE

---THE GREAT CITIES OF THE NORTHWEST

THE PALOUSE REGION OF OREGON

(A very detailed description was given here of the agriculture in the Palouse region proper.)

For further information write to
..... **Railroad**
.....City, ...State,
or ..... **State Immigration Bureau**
.....State.

Fig. 32. An approximate replica of posters distributed in Nebraska by W.A.R. in 1906 or 1907 (this replica was prepared by W.A.R. for Publication 46).

The poster told about millions of acres of government land open to homesteading in Oregon that yielded 60-bushel wheat crops and had no crop failures. The lands that were advertised included much of the area between Bend and Burns, Oregon, and were described as being in the "Palouse Region of Oregon." The poster also encouraged the reader to write for more information, which came in the form of a booklet which included glowing descriptions of the agriculture potential of each county in central Oregon, Lake County in particular.

Several years later I had the opportunity to see the true Palouse, as well as the area between Bend and Burns, and they were, and are, vastly different. My first glimpse of the true Palouse came in 1913. I had been working on a survey party for the Canadian Pacific Railway in southeastern British Columbia during the summer, and before returning to school at the University of Nebraska I travelled by rail from Cranbrook, to Spokane, to Lewiston, and return (Fig. 33). Then in 1918 while working on land classification for the U.S. Geological Survey, with headquarters at Condon, Oregon, I had the opportunity to see the "Palouse Region of Oregon" in some detail. My land classification task included an examination of large areas of abandoned 320-acre homesteads in northern Lake County, Oregon.

In 1930, after being hired to develop a soil erosion experiment station at Pullman, Washington, I found myself working in the heart of the Palouse. The Pacific Northwest Soil Erosion and Conservation Experiment Station (Figs. 34-35), established cooperatively by the State College of Washington and the U.S. Department of Agriculture, was conducted jointly by the Bureau of Chemistry and Soils and the Bureau of Agricultural Engineering. I was appointed superintendent of the Station and was in charge of soils work. Paul C. McGrew was assigned to the Station as Agricultural Engineer. The Station was set up to determine the extent of erosion losses and to find practical methods of controlling soil and rainfall losses.

The soil erosion experiment station at Pullman was one of ten throughout the country. The steps leading to establishment of these stations are described below:

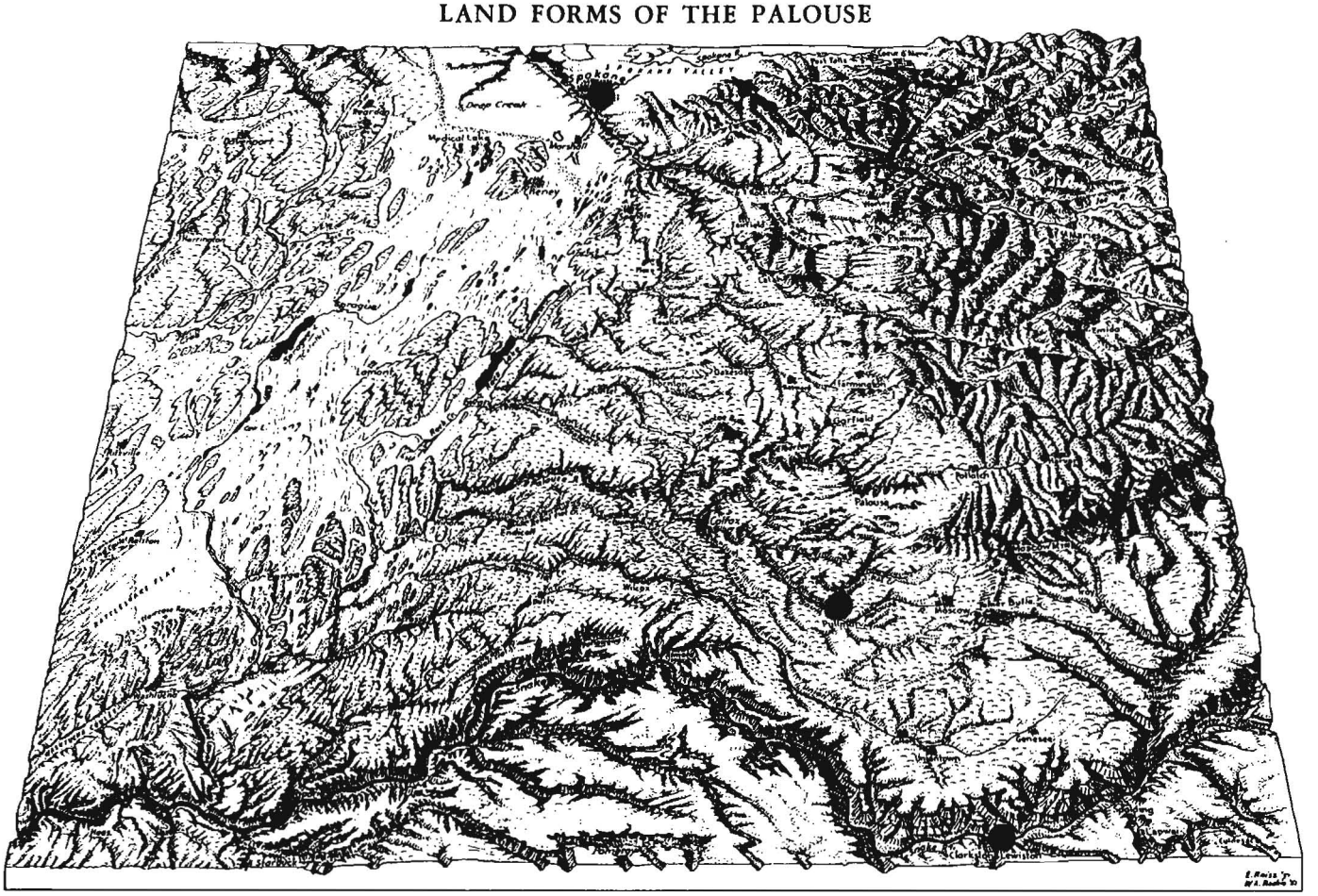

Fig. 33. W.A.R. assisted Erwin Raisz in the final compilation of this landform map in 1951. Spokane, Pullman, and Lewiston are marked by large dots.

The first governmental recognition of the erosion problem in America occurred in 1903 when the United States Department of Agriculture began some field studies in "hillside erosion." In 1914 investigation of field terraces for the prevention of "hillside erosion" was begun. In 1915 the Department began studies in Utah, under the direction of Arthur Sampson, to determine the soil losses from forestland. The writer first studied the effectiveness of field terraces in Louisiana, Texas, and Georgia from 1915 to 1917. The Missouri Agricultural Experiment Station began to measure soil losses under different cropping conditions in 1917, and in 1926 similar studies were begun by the Texas and Oklahoma Agricultural Experiment Stations. Although these and other less formalized studies were spread over a 25-year period, the nation was not yet aware of the problem.

In 1927, however, a USDA bulletin entitled Soil Erosion: A National Menace, by H.H. Bennett and W.R. Chapline, combined with Bennett's personal crusade among the people and before the United States Congress, caused sufficient furor that Congress appropriated $160,000 for the establishment of ten erosion experiment stations. These stations were started in 1930 at the following locations: Statesville, North Carolina; Zanesville, Ohio; La Crosse, Wisconsin; Clarinda,

Fig. 34. Foreman's residence and shed, Pacific Northwest Soil Erosion Station, Pullman, Washington, April 17, 1932.

> Iowa; Bethany, Missouri; Hays, Kansas; Temple, Texas; Guthrie, Oklahoma; Pullman, Washington; and Tyler, Texas.
>
> They were located in what were considered the worst eroding regions in the country, and they were under the direction of H.H. Bennett. The writer was selected to head the station at Pullman, the only one in the western half of the country. Other stations were added to these ten in later years in other badly eroding regions. These stations mark the birthplace of soil conservation (Publication 53).

At the time I began my soil erosion research in the Palouse, most of the tilled land in the Northwest had been cultivated only within the past 40 years. The Willamette Valley and the Palouse country were the only extensive areas that had been farmed for a longer period. Conservation of the soil in the Pacific Northwest was different in this respect from most parts of the United States. In the Piedmont country of the eastern and southern states, in the "Dust Bowl" of the Middle West, in the range lands of the Southwest, and to varying degrees in other sections, it was largely a job of repairing "damaged and ruined land." If these more damaged sections of the country had attained conservation farming when they should have, the tasks there also would have been those of prevention.

The Chinese custom of paying a doctor to keep one well, and of ceasing to pay him during illness, is conservation at its best. The Chinese doctor then works hard to get his patient back to health so he can again receive his continuing fee. The Soil Conservation Service in the 1930's was so busy working with "sick" land that insufficient thought was being given to keeping the good land healthy. There were not enough Soil Conservation doctors to care for both the sick and the healthy, so the tendency was to let the healthy land rely on its own home remedies. This had not proven sufficient in other sections of the United States. It remained to be seen if it would be in the Northwest. Some of the experiments tried at our Station are described briefly:

> ...The major line of investigation which has been initiated to date is a

Fig. 35. W.A.R. in Soil Erosion Station pickup, Pullman, Washington. Vehicle was provided by the U.S.D.A. Bureau of Chemistry and Soils, W.A.R.'s parent agency.

> series of plots from which the runoff and erosion is under absolute control. On these plots most of the major cropping and tillage systems will be tried and the resultant runoff, for instance, from a field of sweet clover, will be compared, and the amount of water which is lost together with the amount of soil carried off in that water will be compared. Some of these plots are twice as long as others in order that we may know whether a long slope runs off proportionately as much water as a short slope. One plot has been desurfaced to subsoil so that all the runoff and erosion from this plot will be similar to the effect upon our clay hill tops, yet placed on a comparable basis with the adjoining black soiled slope...
>
> A rather extensive system of terraces has been partially built, the effect of which it is hoped will tend to materially decrease both runoff and soil erosion. This system of terraces is made up of individual terraces of different lengths, draining different acreages, and with different gradients...(excerpts from a radio talk by W. A. Rockie, April 27, 1931).

In numerous Agricultural Experiment Station bulletins dealing with agricultural land problems, published in the Pacific Northwest between 1918 and 1924, none considered erosion to be a serious problem. In most it was either mentioned in passing or omitted entirely. In 1930, however, the following statement was made about the Palouse:

> Practically all of the crop land of this area has been devoted exclusively to small grain farming for 35 to 50 years. Under this treatment, the soils have lost at least 35 percent of their organic matter, 25 percent of their nitrogen and much of their capacity of absorbing moisture. Furthermore, soil erosion has increased during this period until it has become a serious menace ("Farming Systems for Eastern Washington and Northern Idaho," by George Severance, Byron Hunter and Paul Eke, dually published as Bull. 173 of the Idaho Agric. Exp. Sta., July 1930, and as Bull. 244 of the Wash. Agric. Exp. Sta.).

This was one of the first printed statements of the seriousness of the erosion problem in the Pacific Northwest.

Dr. E.A. Bryan, the first director of the Washington Agricultural Experiment Station, stated in a letter to me dated March 5, 1932:

> I came to the State College as its President and Director of the Experiment station in 1893 and remained Director for about fifteen years and President for twenty-three.
>
> For the first fifteen years our attention was not drawn particularly to soil erosion -- indeed, rather to the absence of it. Of course there were occasionally and in spots what were called "cloud bursts" in which hillsides, no matter how protected by growth, were washed down in spots, while along the canyons tributary to the Snake River the floods would produce havoc. It is

> to be remembered that in that period the land had not been long under cultivation. It was full of small rootlets that held soil particles as a string of beads and the soil was very like a sponge. It was a source of constant wonder to the newcomer how much moisture the ground would take up without any evidence of washing. But the whole situation was somewhat different from what it is now. Most of the wheat was then spring sown and the land went through the winter with some cover which protected the soil.... For the past fifteen years the erosion difficulty has been increasing rapidly, though there has perhaps not been so much difference in the kind and character of the precipitation. Much has been due to the change in the character of the soil itself and the greater absence of cover. It is astounding how little cover prevents or lessens the washing.... Your investigations are of great importance.

Virgin soil generally neither blows nor washes; damage occurs only after some unusual disturbance to the land or to its cover. All natural causes fade into insignificance in the face of agricultural use; and, too frequently, abuse of the land has been the outstanding cause of accelerated erosion in the United States. This was brought out emphatically in a study of heavy summer rains in the Palouse (Rockie and McGrew, 1932, Publication No. 13). Our observations indicated two conclusions: first, that any vegetative cover offers an effective means of preventing losses from soil washing and runoff in the Palouse region; and second, that the principle of summer fallowing (tilling a field during a growing season, but without a vegetative cover) does not facilitate erosion control (Publication 18). Furthermore, results of erosion studies in all parts of the world indicated that these principles of control are equally applicable anywhere (Figs. 36-40).

As erosion progresses from the primary state of sheet erosion to the more advanced stage of gullying, the streams become more muddy from the ever increasing debris. When I was five years old I saw my first clear stream in Nebraska, called Looking-Glass Creek. I had previously thought that well water was clear and stream water was black. I waded in this stream in which my feet were clearly

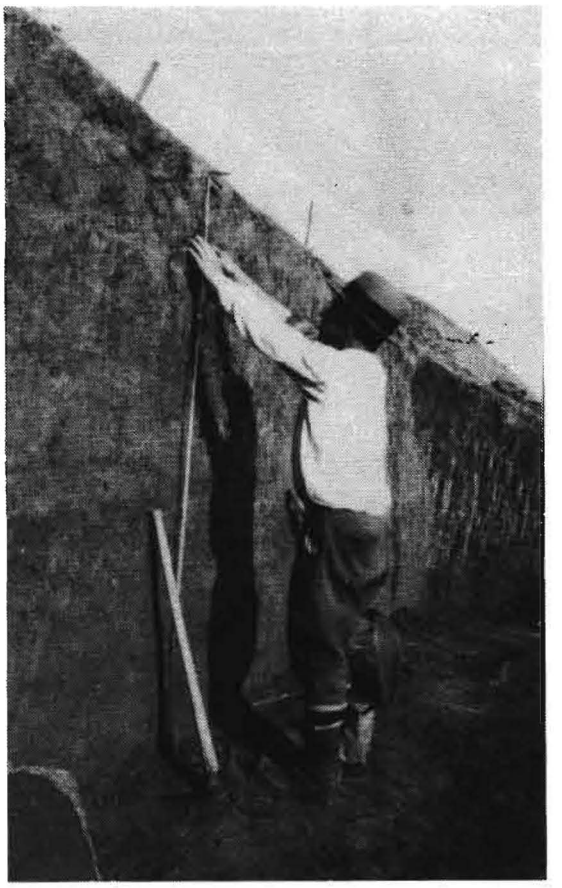

Fig. 36. W.A.R. securing soil sample from excavation for Erosion Building, Pullman, Washington, October 1, 1930.

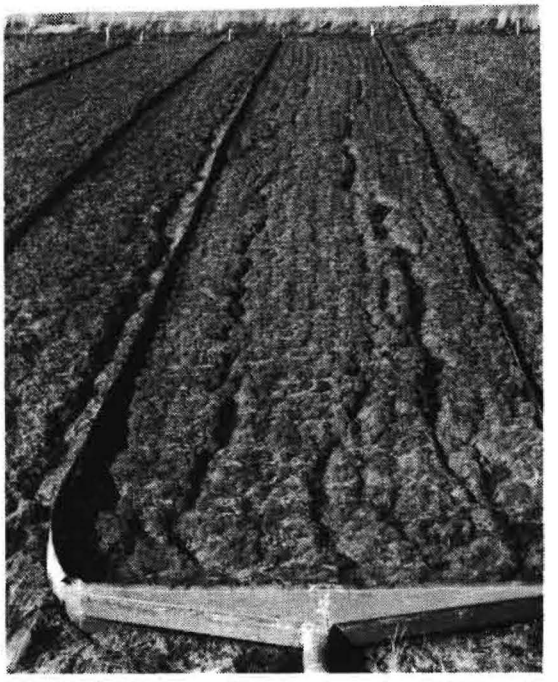

Fig. 37. Control plot with funnel draining into measuring tank in Erosion Building, PNW Soil Erosion Station, Pullman, Washington.

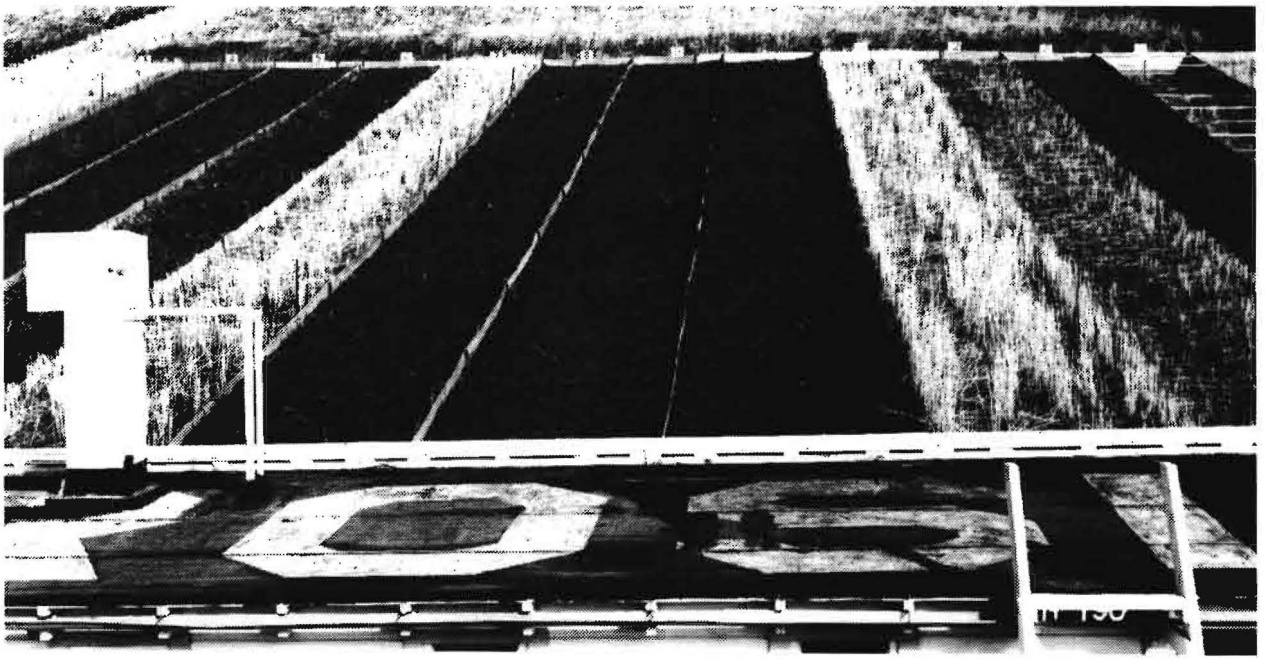

Fig. 38. Control plots for measurement of runoff and erosion under different cropping systems. Soil Conservation Experiment Station, Pullman, Washington. Large lettering "Soil Erosion" is on roof of Erosion Building.

Fig. 39. Tanks inside Erosion Building for measuring runoff from control plots. PNW Soil Erosion Station, Pullman, Washington.

visible through the knee-deep water. It had a sandy bottom. Forty years later I again studied the same spot in this stream; it had become a mud-covered channel with a stream that was always opaque. That section of Nebraska had already changed from the clear to the muddied stream. In the 1930's the streams of the northwest were showing a decided trend in this direction (Fig. 41).

Besides the work I directed at the Experiment Station at Pullman, other cooperative research studies were started at Lind, Washington; Moro, Oregon; and at Moscow, Idaho. The results of these studies showed conclusively that the period of profitable use under the wheat-summer fallow system of farming of the 1930's was limited to a few more decades at most. The results also showed that any one of several modified systems of wheat farming could maintain the Palouse region in permanent agricultural use.

On the national scene, in the fall of 1933 a new agency was formed: The Soil Erosion Service, headed by Hugh H. Bennett (Fig. 42). This agency was essentially an outgrowth of the erosion experiment stations Bennett had started three years earlier. I was named director of Region 11 (Washington, Oregon and Idaho). Within a few weeks there were several thousand employees of the Soil Erosion Service, recruited mainly from state agricultural colleges and state extension services. I secured many of my staff from the faculties of Washington State College, the University of Idaho, Oregon State College, and Montana State College. My appointment to the Soil Erosion Service was

Fig. 40. W.A.R. inspecting 1931 planting of native bunch grass at PNW Erosion Farm two years later. The crop was harvested in 1932 and 1933 for seed. Pullman, Washington, November 5, 1933.

Fig. 41. W.A.R. examining silt and clay deposit two feet deep in Waitsburg, Washington, from flood of March 30-31, 1931. Soil cracked into blocks which indicates a shrinkage of around 10%.

Fir. 42. Hugh H. Bennett, "the Chief" of the Soil Erosion Service.

dated October 10, 1933, and within a month we had a staff of 30 people in the regional office and some 150 people at various field demonstration projects, established to develop erosion controls on a community scale. The best and most adaptable soil-conserving farm practices were tried out in these demonstration projects. Individual methods stood or fell as farmers' trials proved them to be good or bad practices. These projects represented a major step toward a more general acceptance and adoption of conservation farming methods (Publications 14-24).

The new Soil Erosion Service was financed by emergency relief funds of the depression years, and the funds were of sufficient amount (Bennett was given $5,000,000 to work with) that we expanded much too rapidly for the best interests of the work. But those were our orders, to get started, get going, get it done!

While on the subject of spending money, I should mention my efforts to obtain aerial photographs of our soil conservation work areas. In 1923 I took my first photographs from an airplane. They showed so much that I was immediately and permanently sold on aerial photographs.

In 1930 I officially requested aerial photos of the erosion experiment station at Pullman, Washington. My request was refused "partly because of their high cost and partly because they had insufficient value." The following year, 1931, Howard Flint, a Forest Service photographer, unofficially offered at my urgent request to take photos of our experiment station without other cost to the erosion work if I would hire the airplane. I hired a private airplane in Spokane, with pilot Nick Mamer, for two hours, at $16 per hour. As a result, I received fourteen 8 x 11 oblique and vertical negatives (with prints) of the farm, thus getting our first accurate picture of the lands on which we were working. These photos proved invaluable in our work. I submitted a voucher of $32 to Washington, D.C., to pay for the airplane I had hired, and received the voucher back unpaid with a note from Hugh Bennett that I would have to pay the bill myself. A few days later I received two letters of censure from A.G. McCall, Division Chief, and Henry G. Knight, Bureau Chief, and still later, another censuring letter from the Secretary of the Interior! I did pay the bill, although not without protest.

Soon after being named a regional director of the Soil Erosion Service I requested aerial photographs of the 100,000 acres of land in a soil erosion demonstration project, but my request was refused. However, I had already been in discussion with members of the Washington National Guard regarding their taking aerial photos, and was able to get the aerial photo job done without charge if I would buy the film. Since it was not illegal to buy photographic film, this was done. We soon had the aerial pictures we needed through the expert efforts of Dale L. Swartz, pilot, and Jack G. James, photographer (Figs. 43-44). A Mr. Charles Collier in our Washington, D.C. office who had been observing my persistence regarding aerial photos decided to get aerial photos of a similar demonstration project in Virginia. So, I believe the first government contract for aerial photos (of the Virginia project) was let to a commercial company by the Soil Erosion Service in December 1933 or January 1934.

In February, 1934, I was called to Washington D. C., for a conference. One subject was aerial

Fig. 43. Washington National Guard pilot, Dale Swartz (left) and photographer, Jack James. James was also a civilian employee of the Soil Erosion Service (later the Soil Conservation Service).

Fig. 44. Washington National Guard aerial photography team, Dale Swartz and Jack James.

photos, and the recently flown pictures of the Virginia project were on exhibit, to prove they were of no value to our work. And certainly, on the basis of that sample, they were no good to anyone. However, I had brought samples of the aerial photographs of the Palouse Demonstration Project and they were as good as the others were poor. My photos saved the day and when they were shown to the commercial company, the Virginia Demonstration Project was reflown. The replacement photos were nearly (though not quite) as good as mine, taken by the Washington National Guard team of Swartz and James. Aerial photography had finally been established in the Soil Erosion Service. Our 1933 aerial photos of the Palouse project were of sufficient quality that they still attracted favorable comments years later (Figs. 45-47 are examples of aerial photographs of the Palouse area flown by the Washington National Guard in 1937-1939).

Later in 1934, at the request of officials of Washington State College, I showed the aerial photos of the Palouse Demonstration Project to officials of the Agricultural Adjustment Administration who were visiting the Palouse country from Washington, D.C. They were so pleased with the pictures that they took our specifications and shortly afterward issued their first invitation for bids on aerial photos for their work. The initial results were so successful that within the next few months they awarded contracts for aerial photographs of many millions of acres. The usefulness of aerial photographs was no longer in doubt.

In 1935 the Congress passed legislation establishing a national program of soil conservation to be carried out by a new agency in the Department of Agriculture -- the Soil Conservation Service. The action made permanent the already existing Soil Erosion Service, but the replacement of "erosion" with "conservation" gave the name of the new agency a more positive ring; and my title changed from Regional Director to Regional Conservator (Fig. 48). Shortly after the Soil Conservation Service was established in the Department of Agriculture, I had a visit for several days from the Secretary of Agriculture, Henry Wallace. I gave him a tour of the Palouse, and found his visit both interesting and a pleasure. He was seriously interested in the details of our work, and was very knowledgeable (Fig. 49).

In contrast to the delightful visit from Secretary Wallace was an earlier inspection visit by Dr. Rexford G. Tugwell, the Undersecretary of Agriculture. I received word from Washington, D.C., to escort him through our region, and Evan Kelly, Regional Forester for the U.S. Forest Service at Missoula, delivered Dr. Tugwell to me at Moscow, Idaho. Kelly asked if he might go along on the tour, saying, "I'd like to see how you handle the

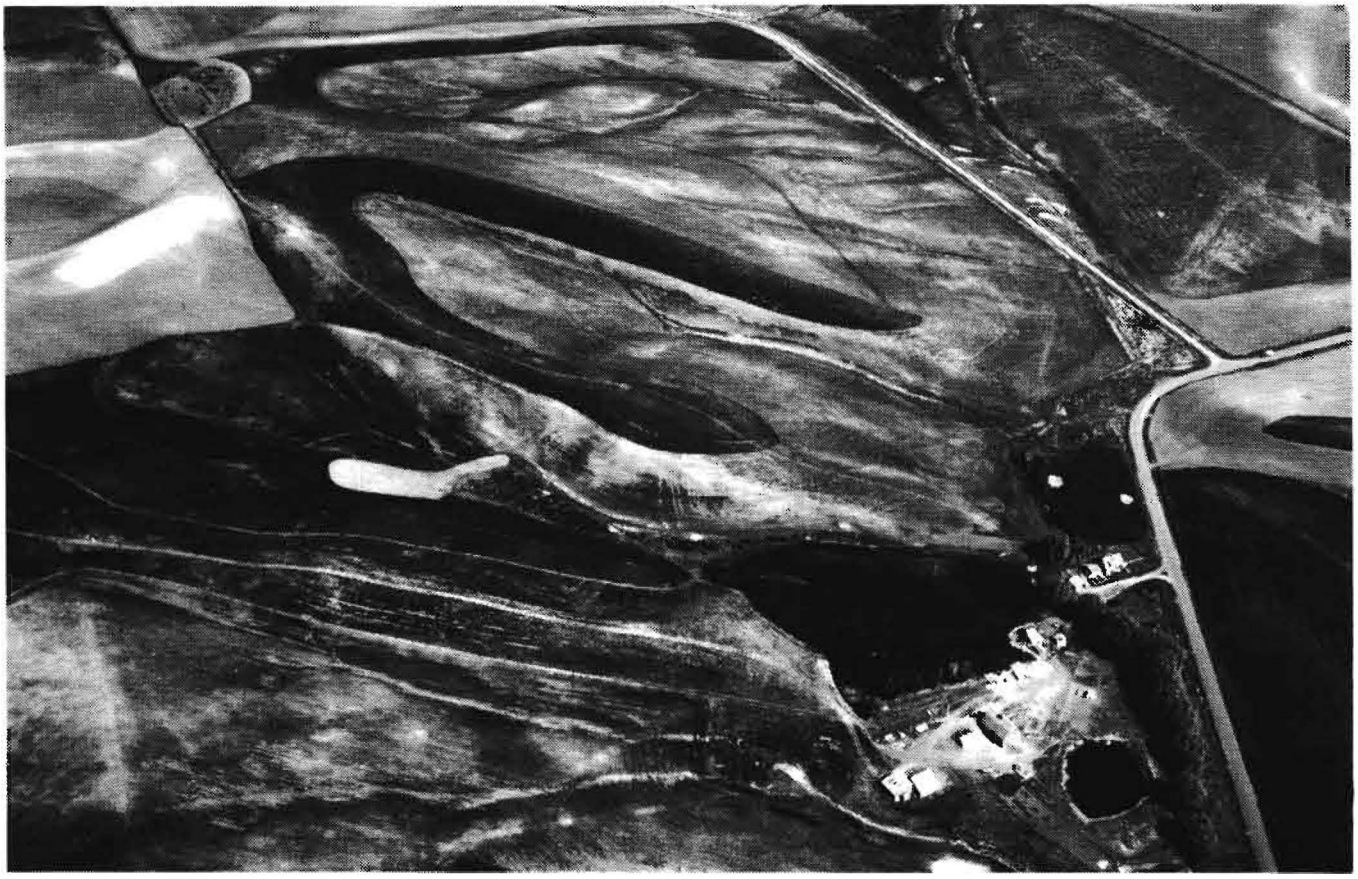

Fig. 45. Four long clay ridges seeded to permanent cover of alfalfa and grass. Henry Meiner farm, approximately five miles southeast of Pullman, Washington, June 7, 1937 (Soil Conservation Service/Washington National Guard).

situation!" Dr. Tugwell was a master at antagonizing people. During the time he was with me he managed to offend several prominent people -- Dean Iddings of the College of Agriculture at the University of Idaho, President Holland of Washington State College, and Paul McGrew of our Pullman office. Before leaving Pullman, Evan Kelly said to me, "You're not having any better luck than I did!"

When the Soil Erosion Service was formed in 1933 it was logical for our regional office to be in Pullman, at least initially, in close proximity to our erosion experiment station. Then in 1935 when the Soil Conservation Service was established, and the number of personnel and scope of operations of our regional office was expanded, the drawbacks to our Pullman location increased. It became apparent that we had outgrown our Pullman office, and the soil conservation activities of our region could be directed more efficiently from Spokane. The move to Spokane was made in June 1936. For me personally, and for many of the staff, the move was a big improvement. I had frequent trips to Washington, D.C., for conferences (Fig. 50), as well as many trips in and around the Pacific Northwest, and Spokane provided better transportation access. Research activities continued at the Soil Conservation Service Experiment Station at Pullman, however, and a number of publications resulted (Publications 27-32).

In 1933 when I was named regional director of the Soil Erosion Service, Clyde E. Deardorff replaced me as superintendent of the Experiment Station at Pullman (I had first worked with Deardorff in the Soil Survey at Waynesboro, Georgia, in 1917). When Deardorff was transferred to the regional office in 1935 he was succeeded by G.M. Horner as Project Supervisor. Paul C. McGrew, the Agricultural Engineer with whom I had started the Experiment Station at Pullman in 1930, continued there until 1936 when he became Assistant Regional Director (Fig. 51).

Fig. 46. This melting snowbank has caused severe soil loss on the fertile land below. Photograph was taken two miles north of Oakesdale, Washington, March 20, 1939. (Soil Conservation Service/Washington National Guard).

After the Soil Conservation Service was established in 1935, a large number of Civilian Conservation Corps camps were transferred from the Forest Service to the Soil Conservation Service to aid the new agency in its demonstration work. I was assigned some thirty C.C.C. camps and given very little time to develop plans, work, and new locations.

One of the camps was located at Warrenton, Oregon, where blowing sand was endangering both public and private property along the Pacific Coast in the Clatsop Plains dune area.

(Note: The following excerpt from an article by E.M. Rowalt is included to clarify the blowing sand problem in the Clatsop Plains area:

> Much of the sand load of the Columbia River, moved about by ocean currents and tides, eventually is swept on to beaches south of the mouth of the river. The prevailing winds then pick up the sand and move it back to the east, overland. During the winter of 1934-35 the dunes moved eastward 150 yards along a 16 mile front ["Anchoring the Clatsop Dunes with Vegetation," Rowalt, E.M., Soil Conservation 2 (4) 61-63, October 1936].)

Shortly after the construction of the necessary buildings at Warrenton I received telephone instructions from Chief Bennett to "Move that camp -- there's no work for them there." I was having enough difficulty keeping the other camps busy so before I'd been able to do anything about the

Fig. 47. Palouse Falls with Palouse River at flood stage. Falls are located ten miles upstream from intersection with Snake River, Whitman County, Washington, April 21, 1938. (Soil Conservation Service/Washington National Guard).

Chief's orders, a man from the Washington, D.C. office came to inspect the Warrenton camp and the work they were doing. When the inspector made his report to Bennett he said, "That camp at Warrenton is your prize camp out in Region 11." A couple of weeks later another inspector appeared, apparently sent by Bennett to see if the first report was true. He gave a report even more flowery about the work of the camp. It was only a month later that Chief Bennett was using the work of that camp as one of the star performances in the United States, and I didn't have to move the camp!

This project, which became one of the highlights of our work with C.C.C. camps, was a multiple phase process. The men at the Warrenton camp constructed picket type sand fences, planted European beach grass (Holland grass) (Ammophila arenaria), American beach grass (A. breviligulata), sea lyme (American dune grass) (Elymus mollis), and later planted shrubs and trees (Figs. 52-54).

Late in 1937 I suffered a ruptured appendix, with nearly fatal results, spending several weeks in the hospital, followed by several more weeks at home. I returned to work briefly, and then attended the annual meeting of the Association of American Geographers at Ann Arbor, Michigan. I was inducted into the Association, and on December 29 was introduced by Nels A. Bengston for my paper presentation on a subject that had become very dear to my heart over the preceding seven years -- "Man's Effects on the Palouse" (Publication 32).

A very interesting friendship resulted from my stay in Ann Arbor. I was assigned a dormitory room at the University of Michigan, and my roommate was George Hubert Wilkins, the polar explorer. He was also a new inductee into the AAG. I greatly enjoyed getting acquainted with Sir Hubert and learning of his many accomplishments and future plans.

From Ann Arbor I went to our S.C.S. headquarters in Washington, D. C., for a series of conferences until late January (Fig. 55). To provide

Fig. 48. W.A.R., Regional Conservator, Region 11, at Soil Conservation Experiment Station, Pullman, Washington, April 7, 1936.

Fig. 49. Visit by Secretary of Agriculture Henry Wallace to Erosion Control Demonstration Project at Pullman, Washington, 1935. L to R: Dean E.C. Johnson (WSC), Dr. A.L. Hafenrichter (SCS Agronomist), Secretary Wallace, Dean E.J. Iddings (U. of Idaho), W.A. Rockie, Regional Conservator, SCS.

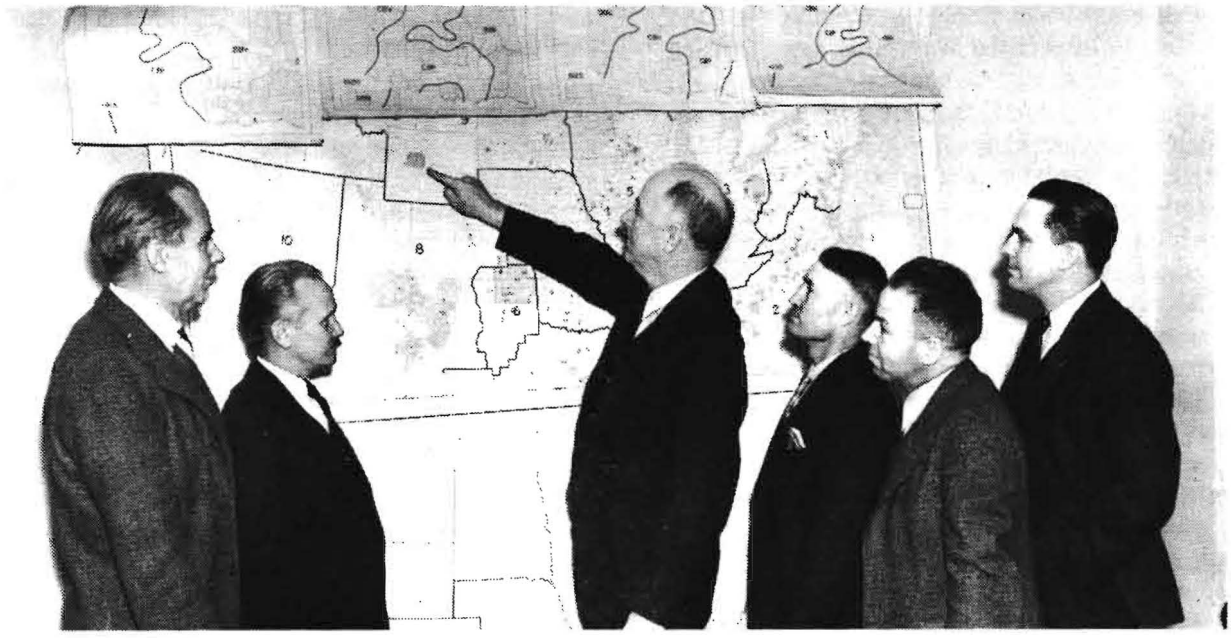

Fig. 50. In Washington, D. C. office, February 1936. L to R: Calkins, Finnell, Bennett, Clumner, Rockie, Merrill.

Fig. 51. August 5, 1936. Soil Conservation Experiment Station, Pullman, Washington. Left: G.M. Horner standing in field of spring wheat (after winter wheat). Right: P.C. McGrew standing in field of spring wheat (after sweet clover).

Fig. 52. Civilian Conservation Corps men from the Warrenton, Oregon, C.C.C. Camp planting beach grass, Clatsop County, Oregon.

a means for additional recuperation from my emergency surgery two months earlier, I chose to return home by ship. I left New York City on January 22 on the S.S. Virginia, travelled to Cuba, the Panama Canal, and north along the coast to San Francisco. I was back at work in Spokane by mid-February. Despite the leisurely trip home I found my strength still much below par, so that I was not up to the workload required by my position. This culminated in my decision in June to resign as Regional Conservator, which I did at the end of June. Coupled with my resignation was the approval of the Chief, H.H. Bennett, for me to undertake immediately a comprehensive study of the potential agricultural lands in the Territory of Alaska. Thus ended the first phase of my work in soil conservation.

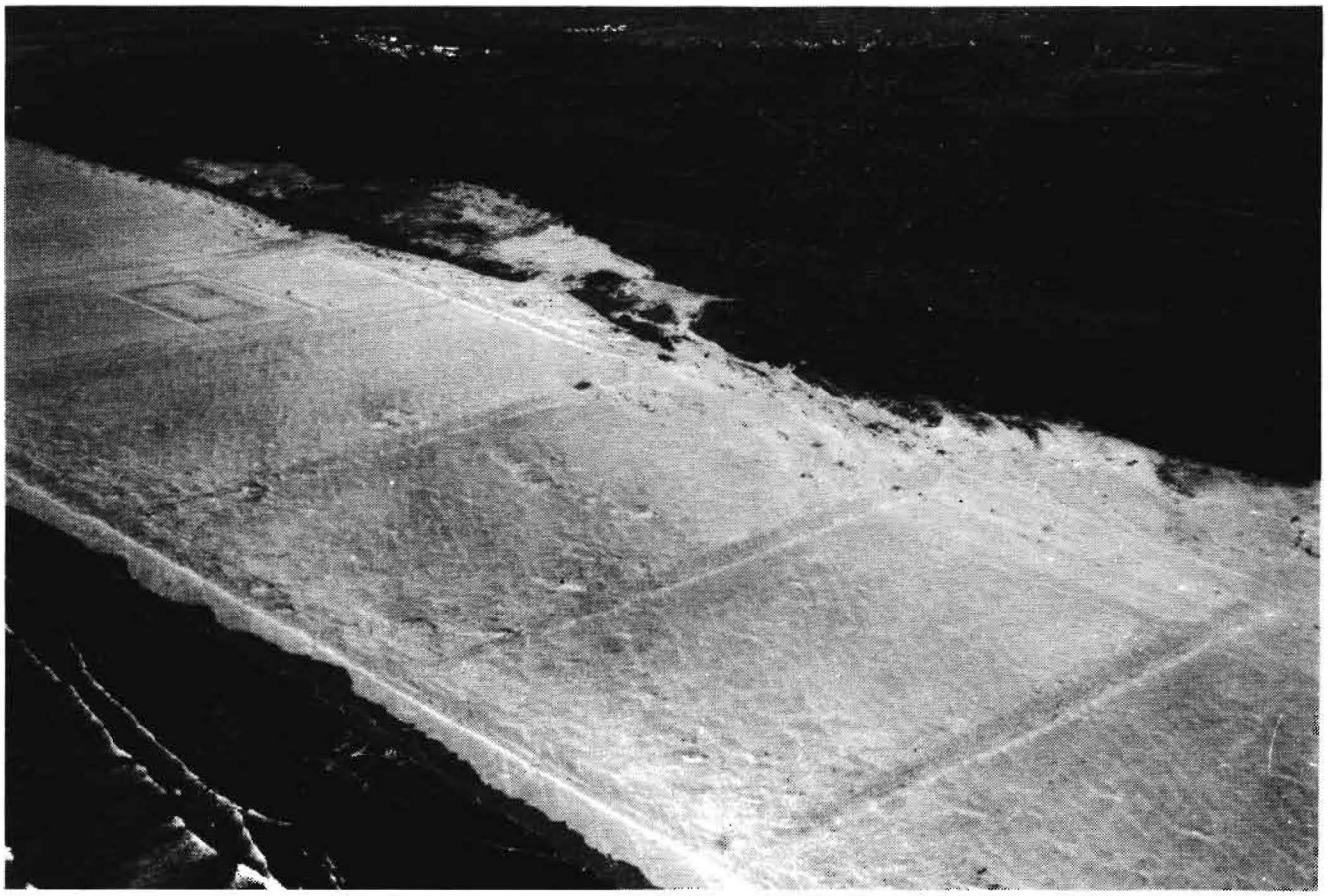

Fig. 53. A wide sand plain west of Coffenbury Lake, Clatsop County, Oregon. Cross fences extending from the fore dune ridge help reduce sand motion prior to establishing vegetative cover. Fort Stevens and Columbia River in background. October 22, 1937. (S.C.S./WNG).

Fig. 54. Looking north toward Columbia River mouth, Clatsop County, Oregon. The picket fences spaced 30 feet apart were constructed in 1936 and raised as dune ridges grew 4-6 feet high. Sea lyme and Holland grass were transplanted and ridges became a new fore dune. October 22, 1937. (S.C.S./WNG).

Fig. 55. Conference of regional directors, Soil Conservation Service, Washington, D.C. Seated: H.H. Bennett "the Chief." Standing (L to R.: R.E. Uhland, T.S. Buie, W.C. Lowdermilk, N.E. Winters, H.H. Finnell, H. Calkins, J.S. Cutler, H.E. Reddick, W.A. Rockie, L.P. Merrill, and A.L. Patrick.