Field Trip, March 4

Nine members and six guests of the Phreatophyte Subcommittee assembled Tuesday at the Le Baron Hotel, San Diego, California, for a field trip to the Cameron and UnGallo chaparral conversion projects in the Morena Watershed. These projects are U.S. Forest Service multipurpose management for water yield, sediment reduction, fire-hazard control, wildlife enhancement, and recreation. These two projects are operational and serve as examples of treatment that could be accomplished in the Morena Watershed. A reconnaissance hydrologic survey identified this watershed as having a very high potential for increasing water yield and reducing sediment. The Forest Service has studies in progress to determine the economic feasibility of expanding conversion to additional areas of the Morena Watershed. Clearing was accomplished with dozer-mounted brush rake and by trailed I-beams, and is followed by seeding with grass. Aspects of wildlife enhancement were presented by the Cleveland National Forest staff range and wildlife specialist. Browseway clearing, one dozer-blade width of breaking off mature chaparral so that new sprouting occurs from the root crown, supplements and is a part of this conversion program. The Forest Service reconnaissance survey indicated that water yields could be increased by roughly 50 percent after treating some 38 percent of the Morena Watershed.

A more detailed summary of the field trip is included under the Forest Service Administration Report (Attached).

Field Trip Participants.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myrvin E. Noble</td>
<td>BLM, Denver</td>
</tr>
<tr>
<td>Thomas E. Grigery</td>
<td>U.S.F.S.</td>
</tr>
<tr>
<td>Arthur V. Potter</td>
<td>Corps of Engineers LA</td>
</tr>
<tr>
<td>John W. Shannon</td>
<td>Calif. Dept. Water Resources, Sacramento</td>
</tr>
<tr>
<td>Jack L. Reveal</td>
<td>USFS - San Diego</td>
</tr>
<tr>
<td>Howard L. Richmond</td>
<td>BLM - Sacramento</td>
</tr>
<tr>
<td>Robert E. Moore</td>
<td>State of Arizona</td>
</tr>
<tr>
<td>Dean M. Schachterle</td>
<td>Bureau of Reclamation, Denver</td>
</tr>
<tr>
<td>J.S. Horton</td>
<td>USFS - Tempe, Arizona</td>
</tr>
<tr>
<td>J.T. Light</td>
<td>USFS - Cleveland NF, San Diego</td>
</tr>
<tr>
<td>Floyd Farrell</td>
<td>BIA - Phoenix, Arizona</td>
</tr>
</tbody>
</table>
Meeting, March 5

I. Introduction. The 69-1 meeting of the Phreatophyte Subcommittee was called to order at 8:30 a.m. by Arthur V. Potter, Chairman. The meeting was held at the Le Baron Hotel, San Diego, California. Eleven members or alternates and 2 guests were present:

<table>
<thead>
<tr>
<th>Name</th>
<th>Agency</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floyd Farrell</td>
<td>Bureau of Indian Affairs</td>
<td>Phoenix, Arizona</td>
</tr>
<tr>
<td>Dean Schachterle</td>
<td>Bureau of Reclamation</td>
<td>Denver, Colorado</td>
</tr>
<tr>
<td>Fred O. Case</td>
<td>Soil Conservation Service</td>
<td>Denver, Colorado</td>
</tr>
<tr>
<td>J.S. Horton</td>
<td>U.S. Forest Service</td>
<td>Tempe, Arizona</td>
</tr>
<tr>
<td>Robert E. Moore</td>
<td>State of Arizona</td>
<td>Phoenix, Arizona</td>
</tr>
<tr>
<td>Fred O. Leftwich</td>
<td>U.S. Forest Service</td>
<td>Phoenix, Arizona</td>
</tr>
<tr>
<td>Myrvin E. Noble</td>
<td>Bureau of Land Mgt.</td>
<td>Phoenix, Arizona</td>
</tr>
<tr>
<td>Arthur V. Potter</td>
<td>Corps of Engineers</td>
<td>Denver, Colorado</td>
</tr>
<tr>
<td>David Hale</td>
<td>New Mexico</td>
<td>Sacramento, Calif.</td>
</tr>
<tr>
<td>Harry F. Blaney</td>
<td>UCLA-ARS USDA</td>
<td>Santa Fe, N.M.</td>
</tr>
<tr>
<td>Edwin Haycock</td>
<td>Utah Water and Power Board</td>
<td>Los Angeles, Ca.</td>
</tr>
<tr>
<td>Wes Suhr</td>
<td>USFS</td>
<td>Salt Lake City, Utah</td>
</tr>
</tbody>
</table>

II. Agency Reports

A. Federal

1. Department of Agriculture - Forest Service

   a. Research

   Mr. Jerry Horton, USFS Hydrology Laboratory, reported on a BOR-hosted meeting in Albuquerque concerning a low-flow diversion channel in the Rio Grande, at which many diverse interests were represented. Concern was expressed over possible loss of cottonwoods and this impact on park and
scenic values. A 70-mile scenic parkway along the Rio Grande in the vicinity of Albuquerque is being considered. It was felt that successive lowering of the water table over 3 or 4 years to a depth of 12 to 15 feet would not damage the larger tree species. Because of the impact that vegetation control has on the environment, the Phreatophyte Subcommittee believes that representation of BOR on the subcommittee would be desirable. Art Potter has brought this matter to the attention of Mr. Davoren for his consideration.

Mr. Horton pointed out the questionable status of some phreatophyte projects in Arizona. In some cases, it is uncertain whether so-called "projects" have even been proposed. Bob Moore, Salt River Project (Phoenix, Arizona) volunteered to make a listing of all Arizona projects and indicate whether they are proposed, planned, or active.

b. Administration

Cleveland National Forest personnel took the group on a field trip to the Morena Watershed on March 4. Two type conversion areas were visited, the Cameron (completed) and the UnGallo (active) projects. The fact sheet (attached) was prepared by the Cleveland National Forest. Other items that were covered are outlined in the Attachments.

2. Department of Defense - Corps of Engineers

Art Potter indicated there was no change in status of clearing projects on the Gila. Authorization for Camelback Dam is qualified to require that channel clearing is assured prior to construction of the dam.

3. Department of Interior

a. Bureau of Reclamation

Mr. Schachterle distributed two surveys on woody phreatophytes, one on the Arkansas River in Kansas by Fort Hays Kansas State College, and the other on the Lower Arkansas River Valley of Colorado by Colorado State University. Both surveys were prepared under contract with Region 7 of the Bureau. These reports cover 150 miles in Colorado and 250 miles in Kansas. They are timely and appropriate for our forthcoming meeting with AWRBIAC. Mr. Schachterle reported on clearing projects in progress by the Bureau of Reclamation (attached).
b. Bureau of Indian Affairs

Mr. Floyd Farrell reported on the progress of the San Carlos-Gila River clearing (report attached).

c. Geological Survey

Mr. R.C. Culler could not attend the meeting, but did submit a report (attached).

d. Bureau of Land Management

Mr. Noble reported that BLM is planning to start phreatophyte control on San Simon Wash, Arizona. Mr. Noble received a request from Mr. Lloyd Andres, ARS, Albany, California, for suggestions of woody species that might be suitable for biological-control studies and for which no conflict of interest would exist. It was pointed out by Mr. Horton that our major problem plant, saltcedar, is sold by more than 20 nurseries. Mr. Noble also mentioned that a hybrid of halogeton and Russian thistle is rapidly invading a large area in northwestern Utah. Control measures are being considered.

B. States

1. Arizona

Mr. Moore of Arizona and the Salt River Project reported their latest bid on thinning of cottonwoods in the Verde Valley was $52 per acre, which is up from $39 per acre for the preceding contract. This could affect the size of the program.

2. Utah

Mr. Haycock reported that Land Use maps for the State are available for distribution. Utah State University may receive a Federal grant to study water salvage methods, costs, and some legal aspects of this field.

III. Library Report

Mr. Horton reported the following items:

(1) The Bureau of Reclamation report to develop abstracts on phreatophyte literature is being typed. (2) A supplement to the "List of References on Phreatophytes" will be prepared in 2 to 3 months. (3) "Minutes of Phreatophyte Subcommittee Meetings" (Jan. 51 through Dec. 59) has been distributed. The demand for the "Minutes" has
exceeded the supply. Dean Schachterle will check with Mr. Bowser for a list of the copies distributed and for printing additional copies. The library in the Hydrology Lab at Tempe should have 50 copies on reserve.

IV. Business Items

A. Updating Mailing List - This job continues. A second and final request is being mailed to non-members who did not reply the first time.

B. Task Force Assignments - All task forces are terminated except Library. Task forces will be assigned when there is a specific need.

C. 1969 Meetings - 69-2:
The program for the 69-2 joint meeting with the Standing Committee on Basic Data Collection of AWRBIAC was developed. Information received from Mr. Yost of that committee indicates that AWRBIAC is becoming concerned with phreatophyte problems and may wish to establish a standing committee or task force for this problem area. The Phreatophyte Subcommittee will present the program. We plan tentatively a field trip on the morning of 22 July to the Las Lunas ARS laboratory. We plan to present our history, organization, present activities, and problems in the afternoon session and then reconvene the Phreatophyte Subcommittee in the evening for agency reports and election of officers.

The 69-3 meeting of the Phreatophyte Subcommittee was scheduled for Phoenix, Arizona, on 23 and 24 September. A field trip to the Verde River cottonwood thinning project and meeting space will be arranged by Mr. Bob Moore of Arizona.

D. Scope of Subcommittee - Some members are interested in broadening the scope of the Subcommittee to include upland site vegetation as well as phreatophytes. Several government agencies, State and Federal, are treating upland site vegetation to increase water yields. Specific control projects on upland sites are not presently being considered by any other subcommittee. Art Potter will contact the Water Management Subcommittee chairman to discuss this matter.

E. Storage and Retrieval of Phreatophyte Abstracts - Dr. Henry Anderson (Pacific Southwest Forest and Range Experiment Station) suggested by letter that the Subcommittee may be interested in computerizing the phreatophyte literature abstracts for ease of search and retrieval. Wes Suhr gave Jerry Horton the bulletin describing the computer program (from Anderson). It was mentioned that the
Department of Interior has a program with similar objectives. This subject was referred to Mr. Horton for future action.

Meeting adjourned at 2:30 p.m.

Wes Suhr, Secretary
Phreatophyte Subcommittee

Attachments
U. S. FOREST SERVICE
REPORT OF ACTIVITIES FOR 69-1 MEETING
PHREATOPHYTE SUBCOMMITTEE, PSIAC

by

Wes Suhr

Morena Watershed

I. Average annual precipitation, 17" at dam to 30" at upper divide. Approximate elevation range, 3000' at dam to 6000' at upper divide.

II. Streamflow

A. Present total yield (on-site) by Thornthwaite water balance (using hydrologic reconnaissance data): 3 in. depth/YR

B. Present total yield at Morena Dam gage:
   1937 - 1966 (30-year mean), 7400 AF/YR or 1.2 in./YR
   1945 - 1966 (22-year mean), 2000 AF/YR or 0.3 in./YR

III. Total potential for water yield increase (on-site) if all suitable land (government and private) could be treated:

<table>
<thead>
<tr>
<th>SITE</th>
<th>TOTAL ACRES</th>
<th>ACRES TO TREAT</th>
<th>AREA-INCH1/INCREASE</th>
<th>ACRE-INCH INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grassland</td>
<td>1,680</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pine</td>
<td>3,610</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Riparian</td>
<td>120</td>
<td>91</td>
<td>6.0</td>
<td>546</td>
</tr>
<tr>
<td>Sagebrush</td>
<td>6,470</td>
<td>4,529</td>
<td>4.6</td>
<td>21,000</td>
</tr>
<tr>
<td>Chaparral2/</td>
<td>60,000</td>
<td>23,768</td>
<td>2.8</td>
<td>66,400</td>
</tr>
<tr>
<td>Reservoir3/</td>
<td>1,690</td>
<td>1,690</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>73,570</strong></td>
<td><strong>28,388 (38%)</strong></td>
<td></td>
<td><strong>87,946</strong></td>
</tr>
</tbody>
</table>

The predicted on-site increase with average precipitation is 87,946 acre-inches or 7,329 AF/YR. Would expect less than 50% to reach reservoir.

1/ From Thornthwaite Water Balance, as an average over the whole Subprovince.

2/ Mostly evergreen shrubby vegetation known as the broad-leafed scherophyll type. A few species of the deciduous type may occur (H. E. McMinn and P. A. Muntz). Includes such terms as brush, chamise, mountain-shrub, oak-chaparral, scrub oak, etc.

3/ Morena Reservoir at original full pool.
IV. Sedimentation

A. Measured at Reservoir (1910-1948 average), 1.8 AF/SM/YR

B. Hydrologic reconnaissance survey indicated a full potential reduction to 1.3 AF/SM/YR after total treatment (mainly by stabilizing gullies in meadow-channel alluvium and controlling sheet erosion in chaparral type).

V. Basic Differences Between Phase I and II

A. Reconnaissance survey vs. comprehensive survey

B. On-site vs. off-site

C. Hydrologic Areas vs. Hydrologic Response Units

D. Delineation of treatment areas

E. Total site potential vs. MU constraints

F. Economic evaluation - a benefit/cost assessment for all resources and for all uses.
Cameron Type Conversion Project

History
Project work began in 1961 by the Forest Service. Initial clearing, seeding and first herbicide spray was staged over a 3 year period for type conversion. Hand clearing of fuelbreaks began in 1962 and is continuing. Maintenance of cleared areas by herbicide is also continuing.

Area
Type Conversion (T.C.) 531 Acres
Fuel Breaks (F.B.) 164 Acres
Browseways (B.W.) 114 Acres

Chaparral Species
Chamise (Adenostoma fasciculatum), cupleaf ceanothus (Ceanothus greggi perplexens) and birchleaf mahogany (Cercocarpus betuloides).

Soils
Bancas (rocky and gravelly sandy loam, moderately deep, eroded and 5-31 percent slopes) and is good for perennial grass establishment. Kentwood & Mottsville (Coarse sandy loam, 0-5 percent slopes and deep) and is good only for annual grass establishment.

Methods
Clearing was done by brushland rake mounted on D-7 tractor blade. Fuelbreak clearing on slopes steeper than 30 percent was done by hand.

Browseways were done by D-7 tractor with blade 6 inches above soil to break brush above the root crown.

Seed was drilled by rangeland drill.

Herbicide spray to control brush sprouts by a "brush killer," a 50:50 mixture of 2, 4-D and 2,4,5-T at a rate of 4 pounds per acid equivalent per acre. Application was made by both tractor and aerial methods.

Planted Species
Topar pubescent and Greenar intermediate wheatgrass, smilo and Harding grass at approximately 8 pounds per acre.

Water Supply
Yearlong springs exist in the deep canyons adjacent to the area. Water developments, consist of:

- 2 15,000 Gallon water catchment developments
- 2 10,000 Gallon water catchment developments
- 1 10,000 Gallon spring development

Evaluation
The newly established openings and available water created "edge" and additional forage to provide up to 60 deer days per acre use as compared to 5 deer days per acre use before.

Grazing capacity for livestock increased in the 755 acre area from 20 acres per cow month to approximately 1 acre per cow month. This represents an annual increase of $450 as compared to $26.
Greenhouse and nursery culturing and testing of saltcedar with herbicides are continuing in the Denver laboratories. The field evaluation of ten chemical formulations and combinations are currently being evaluated in the Arkansas River Valley near Pueblo, Colorado. Herbicide treatments made in August 1968 will be evaluated during the summer of 1969. Additional plots will be treated during the coming summer growing season.

Region 5

Pecos River Basin Water Salvage Project

Lake Arthur Area. An area of 6,700 acres between Hagerman and Artesia, New Mexico is being cleared by Bates, Inc., of Albuquerque, New Mexico. The contract amount is $187,000.

The contract was awarded in May, but the contractor did not begin work until November 1. Equipment being used consists of: one each of G-80 and G-60 Le Tourneau tree crushers; two TD-20 crawler tractors with dozers; one D-8 crawler with dozer; one John Deere crawler with root rake; and two brush choppers.

McMillan Dam to Texas-New Mexico State Line. A contract to clear a cross area of 6,500 acres was let to Armstrong and Armstrong of Roswell, New Mexico for the sum of $238,000.

Work began December 2, 1968, using conventional equipment, three crawler tractors with dozers and with root rakes, and a root plow as alternate equipment. The contractor has rough cleared about 60 percent of the area and completed about 10 percent of the upstream portion.

Bitter Lake. About 1,200 acres of rough-cleared area were completed by treatment with a rolling brush chopper for $10,368 by Thad Sandford of Carlsbad, New Mexico.

Operation and Maintenance

Activity for 1968 consisted mostly of assembly of equipment and preparatory work, but about 400 acres on the Bitter Lake Refuge were treated by reducing regrowth with Model B-7 Marden brush cutters. Treatment of regrowth is being continued downstream.
Estimation of the effectiveness of the 2,4-DP application last June was made by a stem count in selected strips. An average kill of about 53 percent was indicated. Actual count varied from 45 percent to 65 percent. A followup will be made prior to retreatment next growing season.

**Rio Grande Project**

During the period November 1, 1968 and January 31, 1969, a total of 171 acres of phreatophytes were treated with the Bureau's Servis cutter with spray equipment, using 75 gallons of Kuron and 75 gallons of TA-120.

**Middle Rio Grand Project**

**Calendar Year 1968:**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Acres</th>
<th>Cost</th>
<th>Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Mowing</td>
<td>4,356</td>
<td>$24,639.82</td>
<td>$5.66</td>
</tr>
<tr>
<td>Root Plow</td>
<td>2,850</td>
<td>16,035.31</td>
<td>5.63</td>
</tr>
<tr>
<td>Chemical Spraying (Aerial)</td>
<td>1,400</td>
<td>15,806.00</td>
<td>11.29</td>
</tr>
<tr>
<td>Chemical Spraying (Gr.)</td>
<td>1,402</td>
<td>9,335.81</td>
<td>6.66</td>
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</tbody>
</table>

**Region 7**

Presently, water courses, river bottoms, and shorelines of reservoirs constructed primarily for irrigation, flood control, recreation and fish and wildlife in the States of Colorado, Nebraska and Kansas are becoming heavily infested with woody phreatophytes. Usually, a mixture of species is commonly found, consisting of cottonwood, willow and saltcedar in that order of importance. Only rarely are pure stands of saltcedar found in this area of the high plains. In recent years, there has been a noticeable increase in another woody species, Russian Olive, particularly along river bottoms of Eastern Colorado, Western Nebraska, and Western Kansas. All of the obnoxious phreatophytes usually found in this area are being used in farm and urban home landscape plantings and in farm shelterbelt and windbreak plantings.

In the past 25 years, many large storage dams have been constructed on major rivers and principal tributaries to control floods and to store water for irrigation, power production and recreation and fish and wildlife. River channels which were once scoured by heavy floods at frequent intervals are now carrying only controlled releases of water. These changes in river operation have resulted in narrowing the open channel, thus resulting in a steady invasion of woody phreatophytes mostly cottonwood and willow interspersed with a small amount of saltcedar along the river banks. In several instances, the channels are becoming so confined that large controlled
releases of flood or irrigation water are impossible because of the damage that would result to adjacent landowners.

Before undertaking large-scale clearing operations, it has been necessary to survey and make an inventory of known infestations of phreatophytes. In 1968 contracts with Colorado State University and Ft. Hays Kansas State College were completed for a reconnaissance-type survey of the Arkansas River between Pueblo, Colorado and Great Bend, Kansas. The survey covered 150 river miles in Colorado and 250 miles in Kansas. It revealed 39,331 acres of woody phreatophytes in the study area in Colorado and 22,842 acres in the study area in Kansas.

A survey of all phreatophytes was completed on Cedar Bluff Reservoir, Kansas on the area between top of conservation pool and top of the flood control pool. This work was completed under a contract with Ft. Hays Kansas State College.

The above-mentioned survey reports are available from Regional Director, Region 7, Bureau of Reclamation, Building 20, Denver Federal Center, Denver, Colorado 80225.

During 1969 additional woody phreatophyte surveys are planned for the Republican River in Nebraska and Webster and Lovewell Reservoirs in Kansas. Limited control programs will be initiated as the need arises in order to operate and maintain Bureau projects efficiently.
It appears that Kennecott Copper Company will grant an easement for the clearing of approximately 2,600 acres of phreatophyte adjacent to the Gila River in the Winkelman Valley. If and when the easement is granted, the Army Corps of Engineers is authorized, under Public Law 85-500, 85th Congress, approved July 3, 1950, to clear the area. Seeding and maintenance of the area will be the responsibility of the San Carlos Irrigation Project. A small acreage easement was granted by the company in 1957. It was cleared and seeded to grass by the San Carlos Irrigation Project to demonstrate the successful effects of phreatophyte control.

The San Carlos Project is operating a ten-inch Ellicott Cutter-head Hydraulic Pipeline Dredge in the upper reaches of the San Carlos Reservoir. The project anticipates operation of the dredge in the present location for the balance of the fiscal year, and will continue through fiscal year 1970 if funds are available.

All phreatophytic growth on the San Carlos River part of the San Carlos Phreatophyte Control Project not inundated by high water has been completely eradicated as of early January 1969. Thirteen-hundred sixty-three acres were knifed, raked, and partially burned. The equipment subsequently has been moved to Subreach 2, the primary study area by the U.S. Geological Survey, where an additional 427 acres have been knifed. A total of 6,300 acres has been cleared to date including the acreage cleared on the San Carlos River and Subreach 2. Maintenance of the project has been fairly successful. Methods used to control sprouting and regrowth consist of root plowing, diskening, and chemical control. Root plowing and diskening have been very successful, while chemical sprays appear to have been successful; however it is a little early to be certain. A dormant spray is being used to control phreatophyte regrowth in damp boggy areas where maintenance with heavy equipment is not possible. The success of the dormant spray program will not be determined for some time.

Studies are being continued to determine the best grasses with which to replace phreatophyte removed along the flood plains of the Gila and San Carlos rivers. Two small plots, one on the Gila River and one on the San Carlos River, were selected and will be seeded beginning in March. Even though large areas have been seeded with considerable success, further information is needed to improve upon the seeding program.
Areal extent of phreatophytes and hydrophytes in the Western States by T. W. Robinson

Mr. Robinson announced that additional copies of the state reports for Colorado, New Mexico, Utah, and Arizona are available. Requests should be addressed to T. W. Robinson, U. S. Geological Survey, 345 Middlefield Road, Menlo Park, California, 94025. He also stated that the report for Nevada will be ready for distribution in about 3 months.

Buckeye, Arizona Project

A report by T. E. A. van Hylckama entitled "Plant growth and water use as affected by salinity of soil moisture and density of stand" will be published in Water Resources Research in the near future.

Gila River Phreatophyte Project

A paper entitled "Application of infrared color photography to the description of flood plain vegetation" was presented by R. C. Culler to the Workshop on Aerial Color Photography in the Plant Sciences at the University of Florida March 5-7. The papers presented at this meeting will be published by the Florida Department of Agriculture, Division of Plant Industry.