

## ALAMEDA COUNTY

The range work in Alameda County is done by George McNeely who also does the range and pasture work in Santa Clara County and programs will be discussed jointly under the heading of Alameda County.

George has done quite a lot of work testing the value of chicken manure on ranges in Alameda County and Stan Coates has done some similar work on rangelands in Santa Clara County particularly on the east side of the central part of the Santa Clara Valley.

Both Sub and Rose clover seem to be fairly well adapted in a number of areas of both Alameda and Santa Clara County. Some varietal testing has been done in these areas and adapted varieties of these two plants have been fairly well determined. Clare Sub clover seems to be well adapted, particularly in Alameda County. I would expect that, since Clare likes a nearly neutral soil, some further work should be done in checking out some of the Medics for this area.

A considerable amount of work has been done in the San Antonio Valley area of Santa Clara County. This area lies south of Livermore and on the west side of Mt. Hamilton. Here the environment for both clovers and perennial grasses is much more severe than it is in other parts of the area and establishment is somewhat more difficult. There appears to be an inoculation problem on Sub clover in this area and more work should be done to check this out. George has taken a look at most of our range grasses in this area and has them pretty well sorted out as to their adaptability for the area. I don't think any further work on grass adaptability needs to be done there until we get some newer species to work with.

George has been sent some seed of the Lutana variety of Cicer milkvetch for trial in the San Antonio Valley area and this should be followed up this fall.

I have done very little work with Bob Plaister on ranges in the last several years in Amador County. Shortly after Bob came into the county he did a very nice piece of work checking out the soil fertility requirements of the various range areas in the county. He has done some brush control work with control burning and has been doing a lot of very good work on brush control and general range improvement by the wise use of goats. There is a considerable area of Amador County lying west and north of Lone that will probably have some problems in clover establishment. This is an area I have always thought had an inoculation problem and I am sure a fertility problem. If Bob is of the mind to do it considerable mileage could be gained from some good well laid out trials to find out just what it takes to get Sub clover established and what it takes to bring about optimum production. While little evaluation work for Sub and Rose clover varieties have been done in Amador County I think we could probably extrapolate pretty well the results secured in adjacent counties.

Bob has done an excellent piece of work in connection with the grass tetany program and whatever help and encouragement is necessary to bring this work to a successful conclusion should be provided.

## BUTTE COUNTY

Carl Wick is doing the range work in Butte County and has a good county program going. He has done a lot of work in cooperation with Jim Street, Bud Kay, Bill Martin and Les Berry on the Ahart Ranch in the southwestern part of the county. Most of the Ahart trials have served their purpose and are not being maintained as active plots. However, it would be interesting to make observations on them from time to time to see how fertility treatments are lasting and what clover varieties finally segregate out as being the best adapted.

Carl has pretty well determined what varieties of Rose and Sub clover are best adapted for the particular areas of the county and has a number of successfully established commercial plantings. I think there is a need to do some more work in determining what kind of soil preparation is necessary in some of the old terrace soils south of Palermo. Carl is concerned that the knowledge on legume establishment is not being used by Butte County growers. Any ideas that the specialist might be able to provide in further extending this knowledge would be put to good use.

Carl would be a good person to work with in developing some good information about livestock management on Sub clover pastures because he is getting enough commercial acreage established so that some grazing trials can be conducted.

There has been very little brush control activity in Butte County.

## CALAVERAS COUNTY

Dan Irving has a reasonably well balanced range program operating and it is doubtful that he can find the time to put more effort into range work than he is already doing. Sub and Rose clover are well adapted in many parts of the county. However, in the eastern part of the county in elevations above 3,000 feet he has had considerable difficulty in establishing and maintaining clover stands. Bill Martin and I have done some work with Dan in this area without very much success. Inoculation may be part of the problem and I feel fairly certain that cold temperatures, low fertility and poor soil structure are all involved.

There is a small amount of control burning activity in the county. A cooperative range demonstration project to be conducted jointly by the California Division of Forestry, the Calaveras County farm advisor and Vince Triscornia, a San Andreas rancher, testing the usefulness of the Tomahawk brush crusher as a range improvement tool was agreed upon and all cooperative agreements were signed. However, before the project could get underway budget restrictions imposed upon the California Division of Forestry forced a postponement of the project. I don't think this project should be forgotten about because it would provide some of the information which we are going to need in the fuel management work which still needs to be done. Perhaps a little judicious pressure applied both to the farm advisor and the State Division of Forestry might get this project started again as the state's financial picture begins to improve.



COLUSA COUNTY

The range improvement work in Colusa County is presently being done by Monte Bell in Glenn County and will be discussed in the Glenn section.

CONTRA COSTA COUNTY

Paul Lamborn is doing the work in this county and has pretty well worked out the clover varietal adaptation information necessary for good clover establishment programs. Inoculation and fertility information appear to be adequate and growers generally are accepting the program. I think the principal thing which needs to be worked out in this county is a good livestock management program which will permit the establishment and maintenance of clover stands.

There is a small medusahead infestation near Moraga and it is as far as I know the only infestation in the county. The landowner and present leasor appear to be little interested in control. However, it might be well to take a look at this area and try to introduce control procedures.

Some fuel management around residences and other areas of population should be instigated and there appears to be a place for the wildland specialist to develop some fuel management programs in Contra Costa County.

EL DORADO COUNTY

I have done very little work with Barry Leeson in the past three years. There seems to be no problem in establishing Sub and Rose clover in the area and these plants are present on many of the foothill ranches. Fertility treatments for these plants have been worked out in the county, but I have the feeling that not much of the present acreage is fertilized to the extent that it should be. Perhaps the thing most needed in clover management in this county is the development of good livestock management programs to permit maximum production of these plants.

There is considerable need for brush control in the area, both from a standpoint of range improvement and fuel management around the many residences which are springing up in the foothill area. Barry is doing a considerable amount of work with Bob Plaister on the use of goats as a brush control agent. He is also concerned with and doing quite a little bit of work on the toxic effects of coffeeberry on goats.

## FRESNO COUNTY

Aaron Nelson is doing most of the range work in Fresno County, but he does get some help from time-to-time from Bob Sheesley who is concerned with forage production on areas other than range land. Some varietal adaptation work with range clovers has been done together with some inoculation work. Species recommendations and establishment procedures have been pretty well worked out for most of the county. Ranches appear to be increasing the acreage they are planting to range clovers but like most counties proper livestock management techniques to permit the maximum clover production still need to be worked out.

Fresno County is still active in a range burning program with much of the activity occurring on the west side. A cooperative range demonstration project between the California Division of Forestry and the Fresno County Farm Advisors' Office has recently been established in the area west of Coalinga. The status of this project should be checked and a little more input from the range specialist might be helpful in guiding the direction of the program.

Aaron Nelson has ramrodded a very good Medusahead control program on the east side of the county. Through Aaron's efforts this has become almost a community activity. Certainly it is a good demonstration of an agency cooperative program because the Forest Service, Soil Conservation Service, County Department of Agriculture, County Farm Advisor and landowners are all involved in this program. It has probably reached the point where little more reduction of Medusahead can be expected from chemical means and it will now be necessary to establish competitive crops in the area. I think we have enough information now to enable us to establish and maintain a Sub clover population in most of the areas where Medusahead is growing. This is an area where I think Aaron needs a little bit more encouragement and perhaps a little more extension specialist's time than I have been able to devote to the project.

## GLENN COUNTY

Monte Bell is doing the range work in both Glenn and Colusa counties and has developed an excellent program. Clover varieties have been pretty well sorted out and establishment techniques worked out and demonstrated. Several large commercial seedings have been established, but many of them need further fertility treatments.

A detailed phosphorus rate and placement trial on annual clover pasture was established in the fall of 1971 on the Oscar Burrows ranch northeast of Orland. This trial did not make enough growth for harvest this year although a visual rating was made. It should be carried for several years to get the information we need out of the trial.

Monte has worked out, together with state specialists, good native range fertilizer recommendations and range fertilization is becoming an establishment management program in Glenn County. He has some work going testing the efficiency of applying sulfur in a slurry-like solution to range lands. These trials were established in the fall of 1971 and did not receive sufficient rain for adequate evaluation this year. Long-time observations and harvesting of these trials should be encouraged.

Monte is a good field researcher and he has a number of excellent cooperators. Field experiments established in this county have an excellent chance of being carried through to satisfactory conclusions.

## HUMBOLDT - DEL NORTE COUNTIES

The range work in Humboldt County is done by Duahne Cooper, and all the work including range in Del Norte County is done by Murph Westing.

In spite of the fact that Sub clover has been grown in Humboldt-Del Norte Counties for a long time there is still need for considerable work to be done in developing establishment techniques in some of the more difficult areas of the counties. I am sure that inoculation is a problem in many places and that lack of proper inoculation has been the cause of stand failures in areas of low fertility and harsh climatic conditions.

Preliminary work has demonstrated lime responses on some Humboldt soils and considerably more work needs to be done to delineate the areas in which lime is required for satisfactory establishment and maintenance of clover stands.

A phosphorus rate sulfur source trial has been established on the Rush property on Bear Ridge above Scotia. A stand of clover has become well enough established that the plot could be harvested next year. My experience has been that you are going to have to keep asking Coop for information about the plot and then probably you're going to have to go look at it yourself before you know what's happened.

There is a lot of brush burning going on in the county but it is done on an individual basis and no range improvement organization is functioning in the area. I think there needs to be some organizational assistance developed for the burning program and that it can perhaps best be accomplished by strengthening the interest of the Cattlemen's Association in a burning program rather than by attempting to develop a separate range improvement association.



## IMPERIAL COUNTY

There is no range work per se being conducted in Imperial County. I have been working with Bob Hagemann on his irrigated pasture program which is based largely on annual forages, mostly annual ryegrass but some winter cereal pasture and some sudan pasture. Right now there is a lot of interest in the use of annual rye and the acreage has grown to over 30,000 acres in the last four or five years. Ryegrass requires a lot of nitrogen fertilization for maximum production and as we become more conscious of nitrate problems both as a soil and ground water pollutant and as a toxicity problem to livestock, it will be necessary to work out a more precise nitrogen fertilization program than is being followed now.

Bob has become interested in a ryegrass variety selection program and needs both some encouragement and some technical help in evaluating the number of ryegrass cultivars which are available as well as with the possibility of making some local selections which may be better adapted to the climate of the Imperial Valley.

INYO - MONO COUNTIES

I have done little range work with Dean Smith in these two counties and I don't think there is very much opportunity for a range improvement program there although there is considerable opportunity for a mountain meadow and irrigated pasture improvement program. Dean is having some success in encouraging a number of operators to quit bellyaching about the fact that they haven't got any water and try to figure out how to use the water they have. He needs encouragement and assistance in this program.

He is working with the Forest Service in establishing perennial grasses in sagebrush controlled areas and has a good program going in willow and other riparian vegetation control work in some of the river bottom areas.

## KERN COUNTY

Agricultural Extension does not do much range work now in Kern County. Roy Parker has the range responsibility but I have done very little work with him. Kern County used to have an active range improvement program and there was a considerable amount of control burning done on the east side of the county. There has been practically no burning in Kern County in the last five years.

Roy has done a lot of work in poison plant control, particularly with Locoweed, has done a fair amount of work with Selinicum accumulating plants. He has also done quite a little bit of work in the control of riparian vegetation along the river bottoms on the east side of the county.

Roy has been very active in working with some of his cooperators who run on public land to maintain their grazing permits. I have done some work with him on a mountain meadow fertilization program in the northeast part of the county. The trial was located on private land within the National Forest and on which grazing was controlled by National Forest permits. Significant but non-economic responses from nitrogen fertilization were obtained. He has also done some work with Bud Kay on the Temblor Range project on BLM range.

Roy has frequently called on the range specialist for trouble shooting advice and assistance and I have enjoyed providing this kind of service to him because Roy is an enjoyable guy to work with.

## KINGS COUNTY

Kings County is another county in which there is practically no range work being done because to all extents and purposes there is practically no range in Kings County. Herb Etchegaray has forage responsibility in the county and as such has been involved in legume exploratory trials and was quite active in the early dust control work which was done on the ranges of the lower west side of the San Joaquin Valley.

Up until about two years ago none of our then available legume species appeared to have any adaptation in Kings County. I think it might be worthwhile however to try some of the Medics which we now have available on some of the better sites in the west side.

## LAKE COUNTY

Lake County has always been a difficult county to do range work in but Dale Cannon is making a real try at it. He has recently assisted in the formation and subsequent successful operation of a Range Improvement Association in the county. Brush control is a real problem in this area, both from the standpoint of livestock feed production and from the standpoint of fuel reduction for both wildfire control and wildlife habitat improvement. There are many old demonstrations of the effectiveness of range burning in the area between Lakeport and Hopland. Hardinggrass and Palestine orchardgrass are naturals for the area and are relatively easy to establish and maintain. Here is an area in which the wildland specialist should find a lot of work to be done.

A considerable amount of fertility work has been done on Lake County ranges and pastures. Sulfur deficiency seems to be widespread in the area.

There is room for further sorting out of legume varieties in the county because I am not sure that we can transplant Mendocino and Napa information to the west side of Lake County. West side Colusa information should be applicable to eastern Lake County.

## LASSEN COUNTY

The continuity of Lassen County's range program has suffered from personnel turnover in the county in the last several years. The recent transfer of Carl Rimbey to Lassen County should cause an increase in range improvement activity.

Sam Thurber conducted a number of good wheatgrass evaluation trials in a number of areas in the county. Improved varieties of intermediate, pubescent and tall wheat showed considerably more promise than older varieties. The results of these trials are in the Lassen County file.

Sagebrush reduction has considerable promise in improving forage production in Lassen County and Carl's experience in Plumas County should stand in good stead in this area.

There is both considerable need and considerable opportunity for meadow improvement and livestock management in this whole northeast area of the state. Walt Spivey is working with Carl in the meadow and pasture improvement work in Big Valley. Carl is doing it in the rest of Lassen County and I am not sure yet just how much range and pasture improvement work Carl is going to be able to do in Plumas/Sierra Counties. The things which apply to Lassen County also apply to Plumas/Sierra.



## LOS ANGELES COUNTY

Chet Perry has area wide responsibilities for livestock and range in Los Angeles as well as Orange, Riverside and San Bernardino Counties. There is quite a little bit of range work going on in these several counties but it is difficult for Chet to develop a coordinated program because he is spread pretty thin. He has some good brush control work going on the Hathaway Ranch in Los Angeles County and on the Mission Viejo Ranch in Orange County. The Mission Viejo Ranch has conducted the most recent control burn on private land in southern California that I am aware of. There have been good herbicide follow-up treatments on both of these ranches.

The control of cactus is an important range problem in Los Angeles and Orange Counties and work on the pest is being conducted on the Mission Viejo Ranch in Orange County and on Catalina Island in Los Angeles, reports of which you will find in the Orange and Los Angeles County file.

There are a number of good range demonstration projects in operation on Catalina Island. This is an area a large part of which has been almost completely denuded by severe overgrazing by goats for the past several hundred years. Goats have been removed from much of the area by fencing and elimination and a range reseeding program based on the use of Hardinggrass and wheatgrass has been undertaken. Probably the largest single planting of Hardinggrass that you will find any place in the state are existent on Catalina Island. Hardinggrass seems to be the variety which survives Catalina conditions the best of the varieties which have been used. Wheatgrasses do not seem to have the drought tolerance of Harding and this is true also of Perligrass. There is not much potential for the working out of livestock management programs on this area because the area is being developed for a commercial buffalo ranch rather than a commercial cattle ranch. Buffalo do not lend themselves as readily to grazing management as do cattle.

Madera County of course has been the leading county in the state as far as the range clover program has been concerned. Much of the information which we have used in developing range legume programs in other parts of the state have been based on Madera developed information. Good fertility information has been developed with the county and Walt Emrick is gradually bringing about a greater use of phosphorus on Madera County clover plantings. Our inoculation trials conducted in Madera County have demonstrated that there is an inoculation problem in the county and that greater attention needs to be paid to pellet inoculation with improved rhizobial strains on future clover plantings in Madera County. There is still need for improvement in livestock management needs on Madera County clover pastures.

Madera County likewise has lead all the other counties in brush control by control burning and has developed many of the techniques which are presently successfully used by other counties in the state. The control burning program in Madera County has shown a marked decline in recent years but the county still remains a striking demonstration of brush control that can be obtained by wise use of control burning.

Walt Emrick has done a considerable amount of "dry chemical" work on some of the brush species occurring on the east side of the county. He has demonstrated effective control from individual plant treatment with Fenuron, Tordon and Tandex.

I don't know how much longer Walt Emrick is going to remain active in Madera County but when he retires I expect that the range specialist will need to devote quite a little bit of time with his successor in developing new approaches to range improvement. All clover fertility trials should be looked at from time to time to observe residual effects.

MARIN COUNTY

The range work in Marin County is presently being done by Lloyd Harwood from Sonoma.

A phosphorus rate sulfur source fertilizer trial is located on the Tom Furlong Ranch north of Point Reyes Station on Tomales Bay. It has been harvested four times but was not harvested in 1972 because of the dry spring conditions. This plot looks like it is running out of gas and should probably be discussed with Lloyd Harwood and Don Brittsan regarding its future. It is my recommendation that the plot be abandoned because of the severe gopher damage which would prevent accurate harvest even if the plot was refertilized.

As far as I am aware this is the only plot which was established with Don Brittsan and the other range trials existent in Marin County were established by Lloyd Harwood and so will be discussed along with those of Sonoma County.

## MARIPOSA COUNTY

The character of Mariposa agriculture has been changing and the pressure on John Anderson to do range work has decreased and I have not pushed him too hard.

There are a lot of good brush control demonstrations in Mariposa County. Bill Harvey and Oliver Leonard have conducted a number of large scale demonstrations with George Burma of BLM and the old Piney Creek demonstration on Highway 32 northwest of Coulterville are excellent examples of almost complete brush control obtained by control burning followed by seeding and subsequent broadcast herbicide treatment. There is also a good, large-scale brush control demonstration on the Long Ranch just outside of Mariposa which also demonstrates the effectiveness of a control burn program followed by good aerial application of herbicide. The BLM has some of the best brush-to-grass conversion areas in the state and have amply demonstrated that this can be economically done. But, no ranchers in the area have seen fit to adopt the program. This in part is responsible for some of John's lack of enthusiasm in pushing a brush control program.

There has been little range improvement work attempted in the western part of Mariposa County at lower elevations and adjacent to the Merced border. I believe there is an opportunity here for clover establishment and perhaps some more encouragement might be given to Anderson to establish some demonstrations in this area.

## MENDOCINO COUNTY

The range work in Mendocino County is done by Bill Brooks and he has had an excellent program of trials and demonstrations concerning clover evaluation and establishment. The Mendocino County file has a fairly complete listing, maps and reports of these trials.

Bill has the Sub clover varieties sorted out well as far as distribution in Mendocino county is concerned. He has not done as much work with Rose clover as he has with Sub but I think there is a greater use for Rose in parts of Mendocino County than Bill has thought. Proper inoculation of Sub clover appears to be a much more serious problem than we thought. In spite of our work in improving commercial inoculums there are still problem areas in the Booneville section that we have not been able to solve. The Mathenson Ranch and the Johnson Ranch are good cases in point.

There are two phosphorus rate sulfur source trials in Mendocino County which should still be maintained. The Hargas plot at Laytonville is one of the striking examples in the state of the superiority of elemental sulfur to sulfate sulfur as a sulfur source in a high rainfall area. The trial on the Johnson Ranch has not really gotten off the ground yet. Probably because of inoculation problems. The plot continues to improve each year and given a half way decent growing season in 72-73 this plot may produce some of the answers we are looking for. One problem with the Johnson plot has been the difficulty of getting it properly grazed following growth. It would be well to check with Bill Brooks and Milt Jones about the middle of July to see whether or not the gates have been opened and sheep are making proper use of the area.

In the fall of 1971 Bill established a number of trials using the Servis drill on unprepared seedbeds for clover establishment with excellent results. The locations of all of these trials are in the files and should be critically examined in December for regrowth. One thing to check on is the spread of plants between the drill rows. The fertilizer application with the Servis drill is a band-type operation and it has been my observation that in areas of moderate to serious phosphorus deficiency, the plants will not become established between rows where no phosphorus was applied. If the Servis drill and other chisel-type seed applicators turn out to be successful, and I believe they will, it will be necessary to make a broadcast application of phosphorus in order to have plants become established between the drill rows.

Bill has made good use of the Hopland Field Station as a part of his range improvement program in the county. He has taken advantage of the range program being conducted by Milt Jones and Al Murphy on the station and has likewise encouraged both of these people to work with him in off-station trials.

## MERCED COUNTY

Don Petersen does the range work in Merced County and most of his program has been concerned with the establishment of Rose and Sub clover in the foothill areas. He has not done much varietal sorting but the work done in Madera and Stanislaus Counties can be transposed to Merced without any difficulty. Fertility requirements have been pretty well determined for the area and little more fertility work needs to be done in Merced County.

There is a large acreage of clovers established on the east side of the county and the big need here is for proper livestock grazing management in order to maintain the stands and to get maximum production.

Some attempts at clover establishment have been made on the west side but rainfall seems to be the limiting factor. I think we know enough about establishment techniques to get something going on the west side if we happen to get the right growing season in the year of establishment.



## MODOC COUNTY

John Robison is doing the range work in Modoc County but most of his work has been done in cooperation with Cecil Pierce on mountain meadow improvement and in sorting out irrigated pasture varieties.

The Likely experiment range, a joint project carried out by the Modoc County farm advisor's office, the Agronomy Department at Davis (principally Bud Kay), BLM and Flournoy Brothers at Likely, has provided good information about sagebrush control, perennial grass establishment techniques and grass species adaptation. The superiority of Owahee intermediate wheatgrass has been amply demonstrated here. I don't think the information developed here has been extended as widely as it might have been in the northeastern counties. There were good reasons for this and I think some of them have been removed. Perhaps the time is right to encourage the county offices to make wider use of this information now.

## MONTEREY COUNTY

Marion Stanley does the range work in Monterey County and in spite of his being spread pretty thin because of other responsibilities he has developed a lot of information in the area.

The Friend fertilizer trial located near Aramas in northern Monterey County has been completed and is no longer carried as an active trial.

I think Marion has about all the answers he needs on legume establishment but I think we need to sort out the Medic picture a little better in the southern Monterey area.

Livestock management on both improved and unimproved ranges could be improved in the area and I think Marion would be a good man to work with in developing some grazing management information.

Brush control is not being pushed too much in the area. There have been some brush discing trials conducted and I think there is probably a need and an opportunity to continue this type of work.

NAPA COUNTY

The range work in Napa County is done by Lloyd Harwood from Sonoma and will be discussed under Sonoma County.

ORANGE COUNTY

The range work in Orange County is presently being done by Chet Perry from Los Angeles and is discussed under Los Angeles County.

## PLACER and NEVADA COUNTIES

Bill Mason is doing the range work in Placer and Nevada Counties and has really not gotten a range program going since he has been there. There are several old stands of annual legumes in both counties, many of which need fertility treatments and good grazing management. Rainfall is favorable in the county and there are no really good reasons why legume establishment should not be on a campaign basis.

Placer and Nevada County agriculture are undergoing considerable changes and range improvement and brush control in the future will probably be done more for aesthetic value and fuel management purposes than they will be for the enhancement of livestock production. There are opportunities for good wildland management programs to be developed in this area.

Jim McHenry has some excellent blackberry control trials going in Nevada County and these are on the verge of producing valuable control information. Jim is kind of discouraged on these plots because Bill Mason has not shown the interest in cooperating on these trials that Jack Herr did. I am sure the reason is because of lack of time on Bill's part rather than lack of interest. I think he has most of the administrative problems that he inherited straightened out and perhaps could find the time to help finish up these blackberry trials. We need the information on blackberry control on irrigated pastures in wet meadows and I think it would be worthwhile to devote some effort to completing the trials that are established.

PLUMAS COUNTY

I don't know who is doing the range work in Plumas County now since Carl Rimbey has been transferred to Lassen County. I suspect that if much work is done in Plumas County it will be done by Carl.

Good weed control on mountain meadows has been developed in Plumas County and a lot of sagebrush spraying has been done. This work is discussed more in detail under Lassen County.



RIVERSIDE COUNTY

As far as I know there is no formal range improvement program operating in Riverside County. Otis Harvey does the agronomic work in the area and has in the past shown some interest in range work and so he may have a few range trials in operation some place. They have not been reported however. I do not see the need for the development of the range program in the county because the information developed in Los Angeles, Orange and San Diego Counties could be utilized in Riverside with practically no modification.

## SACRAMENTO COUNTY

Little range work has been done in Sacramento County in recent years. Merton Love did the early Rose clover establishment and improvement work in Sacramento County and there is a fairly large acreage of Rose and Sub clover established in the county. Much of it is traceable to the efforts of Jim Ellings when he was farm advisor and county director in the county.

One of the early large-scale range fertilizer trials was conducted in the Sloughhouse area and has pretty well worked out the requirements for native range fertilization for the central foothills on the east side of the valley.

There is still a lot of country on the east side of the county that could and should be producing clover. There is a fairly large area in the southeastern part of the county from Clay Station south to the San Joaquin County line and from Herald east to the Amador County line that obviously has both soil fertility problems and soil physical conditions which need to be worked out as far as clover establishment is concerned. Ted Torngren expressed an interest in doing some work along these lines in this area but Bill Martin and I never got around to getting the job started. This might be an area that Jim Street could work in in some of his legume evaluation work.

## SAN BENITO COUNTY

A considerable amount of range improvement work has been and is being done in San Benito County although I have done very little work with Rocky Lydon. One of the early cooperative range demonstration projects between the California Division of Forestry and county farm advisor's office was conducted in this area, the Spring Dell project in particular. A lot of good information was developed in this project and has been used rather extensively in San Benito and adjacent counties.

Rocky has recently become "re-enthused" about brush control work and has done some excellent work in demonstrating and promoting the use of the "ball and chain" method of preburn brush preparation. He has also been very helpful in working with the staff of the Air Resources Board in developing the guidelines for range improvement burning.

I and a number of other specialists have found it difficult to work with Rocky to the same extent that we work with other farm advisors. I think the most effective way to work with him is to not spend very much time in the county but do quite a little talking to him when you meet him at conferences and ask his opinion about the value of certain practices, particularly those you think he ought to be carrying out and he usually gets an idea from this and goes ahead and starts the thing himself. Perhaps you may be more effective in working directly with him than I have, but I have been able to get him to do things by this technique. He gets them done and his cooperators know about them and that is the sign of a good county program.

SAN BERNARDINO COUNTY

As far as I know no range work as such has been done in San Bernardino County for a number of years. There apparently has been little demand made on the county office for range improvement information and I see no reason why range programs should be developed in the area because, like Riverside County, the information developed in adjacent counties can be modified to meet the needs which may come up.

## SAN DIEGO COUNTY

San Diego County has had an excellent range program over the years and has developed a lot of information which has been utilized in the other southern California counties. Over the past several years the range work has been done first by Vic Brown then Herb Weisheit and is currently being carried by Bob Mullen. The old Massey Ranch demonstration at Tule Springs has been a classic example of the use that can be made of a good, well planned and well conducted demonstration. This project has been an excellent demonstration of the value of a large scale brush control as a means of wildfire control. At least two major fires in San Diego County have been controlled when they ran them into the Tule Springs project.

A good piece of work was done in testing and demonstrating the value and potential of poultry manure as a range fertilizer material.

At the present time the major emphasis in the county program is being placed on brush manipulation for fuel management purposes and as an initial step in conversion of brush to grass. A major cooperative project is currently being carried out by the San Diego County farm advisor's office, the San Diego Watershed Advisory Commission, the San Diego County Agricultural Commissioner and the Bureau of Indian Affairs on the Manzanita Reservation in the south central part of San Diego County. A number of different types of brush control implements have been used and fire will also be used in part of the treatment.

Wheatgrass, both intermediate and pubescent, and Hardinggrass and Palestine orchardgrass have been excellent performers in San Diego County brush lands. Smilo is also an excellent grass in the area. Sub clovers do not appear to be well adapted to San Diego County. Rose clovers show considerable promise and some more work sorting out the Medics needs to be done.

This is the county in which I think the wildland specialist can develop an outstanding program. A number of agencies are actively working on brush management projects. The general public is still extremely conscious of fire damage and the need for fuel management from a fire protection standpoint. San Diego County has money to invest in the program. The farm advisor's office has one man spending full time and somebody like the wildland specialist is needed to coordinate all of the work that is going on. The U.S. Forest Service is also anxious to cooperate. The field is wide open.

SAN JOAQUIN COUNTY

Bill Helphinstine is doing the range work in San Joaquin County. I have not worked too much with Bill because he doesn't have too much range land and what he has is fairly well established to Sub and Rose clover. A lot of it was put in during the soil bank days and so did not have very good management during the time the area was in the soil bank program. Bill has his varieties sorted out well and likewise he knows the fertility requirements of most of the area. My observation has been that grazing management could be improved and I think this is an area in which some good grazing management work might be conducted.

SAN LUIS OBISPO COUNTY

This county has an excellent range program going as you know and so I won't waste much time talking about it. The San Luis Obispo County file is fairly complete and has good plot diagrams and reports.

A range fertilization trial was established last fall on the Tognazzini Ranch at Cayucas and this should probably be checked during the next growing season for carry over effects because of the low rainfall which occurred during the current growing season.

The phosphorus grazing trial on the Goodwin Cattle Company Ranch at Poso should be discussed with Bill Weitkamp to see whether or not it should be restocked again next year. Because of the two poor growing seasons we have had in the three years the trial has been established, I think we are probably still not out of phosphorus and that there should still be considerable phosphorus response on the treated area.

I think Bill Weitkamp has enough information about varieties, fertility requirements and responses, inoculation and other seeding techniques that he can taper this kind of work off and concentrate more on grazing management on both improved and non-improved range.

I have the idea that interest in brush range improvement is declining somewhat in the county and perhaps a little more effort needs to be put on this project because San Luis Obispo still has a lot of brush. Some serious thought should be given to the ranchita project particularly with the idea of determining whether or not the project is still providing additional information. If not, the project probably should be terminated and a final report prepared.



## SAN MATEO COUNTY

Ed Johnson is doing the range work in San Mateo County and I haven't done very much work with him the last two years. There has been some good information developed in the county and much of it is still applicable as far as brush control and species establishment and improvement is concerned.

The commercial livestock business is on the way out in San Mateo County because of the pressure of land values and subdivision encroachment into range land. This, however, does create a lot of need for fuel management and here is another area where the wildland specialist may find a fertile field and good cooperation.

The biology department of Stanford University has control of an area west of Palo Alto which they call Jasper Ridge. This is an area in which grazing has been prohibited for the past several years and there is severe brush encroachment. Hal Mooney of the biology department who is in charge of the area is greatly concerned about the fire problem which is developing and he would like very much to undertake some research on fuel management work. I think the area lends itself to such a research program and Hal Mooney is anxious to cooperate. I spent a day with him going over the problem and I know he would welcome collaboration.

SANTA BARBARA COUNTY

Lin Maxwell and Norman Macleod share the range responsibilities in this county. They probably have the most active range burning program in the state at the present time. The Range Improvement Association brush-to-grass conversion programs and brush spraying programs are Norman Macleod's responsibility. He has some of the best herbicide trials in the state and should be encouraged to write up and publicize his results on his time of application trials on the Arroyo Burro area, the Bishop Ranch and the San Fernando Reye Ranch. Lin Maxwell has been concerned with the legume and grass establishment and range fertilization program. The Burdette Ranch at Lompoc is a striking example of range improvement and an excellent demonstration of the value of Mission veldtgrass on sandy soil.

Gophers are becoming a severe problem on Santa Barbara County ranges and the heavy duty range gopher machine should be used in several places in Santa Barbara County to see if such a machine is practical on the light soil which supports most of Santa Barbara's ranges.

Both Norm and Lin require and respond well to counseling.

SANTA CLARA COUNTY

The Santa Clara County range work is done by George McNeely of Alameda County and has been discussed under the Alameda County section.

## SANTA CRUZ COUNTY

As far as I know little formal range work is done in Santa Cruz County and I have no active program going with the farm advisor there. Apparently the livestock industry in the county has not made demands enough on the county office to get any work started. I think the information developed in adjacent counties can be modified for any use which might be required in Santa Cruz County and see no reason for pushing the range program at this time.

The Santa Cruz campus has a serious vegetation management problem. The objective is to reduce the fire hazard to a minimum but yet maintain the aesthetic values which the campus wants and needs. Frank Borges, the Santa Cruz Campus Fire Marshal is anxious for ideas and suggestions and will carry out any vegetation management programs which the wildland specialist might want to try there. The Chancellor and the Physical Plant Administrator who is really responsible for the maintenance of the campus acreage are also interested in a good fuel management program. They are also interested in using sheep for vegetation control. I think this would be a good place to work.

## SHASTA COUNTY

Walt Johnson is doing the range work in this county and has a good, well-rounded program. There is a phosphorus, sulfur and lime trial currently active on the Howes Ranch just off the east side of the Redding Municipal Airport that needs to be continued for three or four years yet.

There is an active range burning program and Walt vigorously encourages the seeding of control burns. The control burn program is conducted through the range improvement committee of the county cattlemen's association rather than through a separate range improvement association. I think this is probably the way to go in many of the counties that have declining interest in their range improvement associations.

Walt has some excellent comparisons between individual treatments comparing bulldozing with cut-surface chemical treatment for the control of oak trees. The most effective demonstration of this practice is on the Kite-Nielson Ranch in the Ono area.

A trial to test the efficiency of invert emulsions of 2,4,5-T and Silvex in the control of Brewers Oak, a variety of *Quercus garyana*, was established on the Carl Craig Ranch at Shingletown.

The Blue Mountain Ranch operated by W. B. Aldrich and Son at Shingletown is an excellent example of the use of control burning in range improvement in the east side of the county. This ranch was originally burned in 1950.

Walt Spivey is doing some range work in the Fall River Valley area, primarily in sagebrush control and in mountain meadow and irrigated pasture improvement.

## SISKIYOU COUNTY

There is not very much range work being done in Siskiyou County. Roger Benton is the farm advisor with range responsibility. He has conducted a few wheatgrass evaluation trials to sort out some of the material and has helped several growers with wheatgrass seedings, mostly on marginal crop land.

Cana variety of Reed's canarygrass is being tried on the Mieth Lake Ranch north of Doris. This trial is testing the ability of this variety of Reed's canary to withstand a considerable amount of winter flooding as well as a high alkaline environment.

Roger has also done quite a little bit of irrigated pasture variety testing and has several trials comparing Fawn fescue with ordinary Alta fescue.

A considerable amount of Medusahead control work has been conducted in the county in the past but as far as I am aware of, no active control program is going on at the present time. Likewise, I know of no active brush control projects in Siskiyou County.

## SOLANO COUNTY

Art Swenerton does the range work in Solano County and he has done a good job of getting Sub clover pretty well started throughout the county. A lot of clover was established during the soil bank days. There is a phosphorus rate sulfur source trial currently active on the McCormick Ranch south of Dixon. This trial had difficulties in getting established and was harvested this year. There was practically no clover in the portion harvested because it had been excluded from grazing since the time of planting. There was phosphorus differences on the whole forage and results are in the files. The fence was moved this year to enclose the portion of the trial which had been open to grazing since planting and given a half-way decent growing season this fall I expect that this plot should be ready for harvest in the spring of 1973.

Swenerton has his clover establishment program on a campaign basis and gets a considerable amount of clover seeded each year. This is an area in which you may find sufficient clover stands to start doing some grazing management work.



## SONOMA COUNTY

Lloyd Harwood does the range work for Sonoma, Marin and Napa Counties and has a pretty good program going in all three of these locations. Sub clover is a natural for all three of these counties and most of the varietal evaluation work has been done. The main job now is just getting acreages established. This year Lloyd used a John Deere pasture renovator, a shovel opener type drill, in his clover establishment work. The drill was used on open grassland that had no seedbed preparation at all, but did have 500 pounds of single superphosphate broadcast per acre prior to treating with the drill. All the trials this year were on areas where previous attempts to establish Sub clover had failed. Good stands were secured at all locations and in about half of them the Sub clover growth nearly closed the areas between the rows. These sites need to be checked for reestablishment at the beginning of the 1972 growing season. I think this method of establishment utilizing some kind of instrument which merely makes a trench for the seed to light in will be a satisfactory way of establishing clover on much of the open foothill land in the coastal region.

One area, the Parks Ranch at Tomales, has an excellent stand of old Sub clover and is being grazed fairly well. Every time I go over there there seem to be more sheep on the same acreage of clover. I think opportunities for good grazing studies and demonstrations exist here. There are some areas on this Parks Ranch which I believe show severe inoculation problems and Lloyd may need some help in sorting these out.

There is a considerable Italian thistle problem in Sonoma County. Likewise there is an infestation of a weedy-type safflower in the area between Petaluma and Tomales Bay. This area probably needs to be checked to see what the spread is. Lloyd knows where it is. If he is unable to find it Paul Knowles also knows where the infestation is because he was the man who found it.

## STANISLAUS COUNTY

Bill van Riet is now doing the range work in Stanislaus County and the program has gotten to the point where it consists largely of a campaign to get acreages established.

Bill and Jewell Meyer have been doing some sprinkling work on the Larry Hooker Ranch near Empire and have some striking results. Most of the sprinkling work has been done in the spring and has been used to extend the spring rainfall. I think it could have equally as striking results if it were done in the fall about the middle of September or the first of October to get some of these clovers established a little earlier.

Early fertilizer work done in Stanislaus County by Bill Williams pretty well established the value of sulfur in the area. The fertility requirements for the range area of the county have been pretty well worked out by Helphinstine, Thurber and Mason. This information should be available in the Stanislaus County file. In general, single superphosphate needs to be used in this area at about 500 pounds per acre initial. This might be an area in which you would want to start some work to compare massive applications of single superphosphate with 500 pounds of single followed by 100 pounds of single every year and 200 pounds of single every two years.

## SUTTER COUNTY

Chuck Wilson does the range work in Sutter County as well as Yuba and cooperates with Bob McNulty on a combination range improvement, quail habitat improvement project with Ray Conway in Yuba County. Chuck has only been in Sutter County for a short time and is still working on varietal evaluation trials for legume and perennial grasses and is attempting to sort out the fertility requirements for various parts of the county. There is not very much room for range work in Sutter County but the field is wide open in Yuba and much of the area is well adapted to both Sub and Rose clover. There are a number of areas in which Mt. Barker Sub clover could be used. This is probably the latest variety that should be used however and there are lots of areas where the early maturing Geraldton or Daliak should be used. This is also an area in which Wilton Rose clover is a natural although there is a place for Hykon and Kondinin. I doubt there is much place for the medics in this area.

Bob McNulty and Chuck have an interesting project going with Ray Conway on a combination range improvement - quail habitat program. A lot of brush has been cleared and piled for quail cover and has been planted with a mixture of Sub and Rose clover. Poor germination and a poor stand occurred this spring, I think partly due to frost heaving but Ray feels a good deal of it was due to heavy quail consumption of the seeded clover. Ray would like to work on some type of program that would make seed less attractive to quail. Some type of dye might be in order.

## TEHAMA COUNTY

The range work in Tehama County has been done by Ken Ellis but with his transfer to Davis as an Animal Scientist the range specialist may have to put a little more effort into the developing Tehama range program than would otherwise be necessary.

The program in Tehama County is a good one but it is still a developing program and has not had the concerted effort that the programs in Shasta and Glenn Counties have had for as long a period of time. Legume varieties have been pretty well sorted out and a considerable amount of the exploratory fertility work has been done. In most areas of Tehama County the Sub clover variety Woogenellup is probably the latest that should be used. All seeding mixtures should include either Geraldton or Daliak because the season may shut off pretty early. Proper inoculation has been demonstrated to be a problem in the county so all seeding recommendations should stress the importance of pellet inoculation. Much of Ken's significant clover establishment work and several outstanding demonstrations were established on the Tiessiere Ranch but this ranch has been sold and it will be operated as a cattle ranch rather than a sheep ranch and it is doubtful that the new management will maintain the present management which is favorable for clover establishment and maintenance.

Sprinkling both in the fall to promote early germination and in the spring to prolong feed production, has been demonstrated to be extremely effective in Tehama County.

A phosphorus rate and sulfur source fertilizer trial is established on the Cottonwood Creek Ranch and for the first time this year became well enough established for harvest and the yielding of significant information. This trial should be maintained and harvested for at least the next three years.

Oak sprouts following bulldozing of Blue oak trees has developed into a severe problem in the west central part of the county. Many of these sprouts have reached the point where they are no longer capable of being handled by broadcast herbicide sprays but any new clearance work should be watched and put under a good herbicide program. Any initial clearing of oaks undertaken in the county should be done by the cut surface method if at all possible. A brush control trial testing the effectiveness of a Viskorhap method of applying an invert emulsion was established on the Ward Ranch at the end of the Johnson Road. This plot should be evaluated for at least two years more.

TRINITY COUNTY

Practically no effective range work has been done in Trinity County. There are probably many legume evaluation trials and range seeding nurseries safely stored away in the Trinity County office. In spite of the fact that most of Trinity County is publicly owned there are opportunities for both forage improvement and brush control work in the county. I have not been able to devote time enough to Trinity County to get the programs started.

## TULARE COUNTY

The range work in Tulare County is done by Bob Miller and it has only been in the past three years that Bob has become encouraged over the possibilities of establishing legumes in Tulare County. He has outlined a good program using fairly large scale demonstration seeding rather than small legume evaluation plots as a means of developing community demonstrations from which larger commercial seedings can be generated. Bob needs encouragement and responds very well to it. A considerable amount of specialist time can be justified in working in Tulare County so that its clover production potential, which I think is equal to that of Fresno and Madera Counties, can be fulfilled.

TUOLUMNE COUNTY

I am not aware that there is any range work going on in Tuolumne County at the present time.

There has been an excellent brush control program primarily through the use of control burns conducted in the county and fairly good clover establishment in many areas of the county. The potential of Tuolumne County to produce annual legumes is considerably better than it is in Mariposa County and probably about the same as Calaveras. The greatest potential occurs on the western part of the county adjacent to Merced and Stanislaus County.

I suspect that the agriculture of Tuolumne County is changing so that the pressures for range improvement programs are not very great at the present time.



## VENTURA COUNTY

The range work in Ventura County is done by Bob Brendler but only a small percentage of his time can be justified in a range program. Bob has done some excellent work in brush control and there is a considerable potential for the chemical control of coastal sage-type brush. Bob has good recommendations for this and a couple of good aerial applicators to work with.

He has been doing some legume evaluation and there does appear to be some opportunities to establish some of the early maturing Sub and Rose clovers in some of the foothill areas.

Much of the brush land is under the control of oil companies and apparently they could care less whether any brush control work is done in their area. Brush encroachment has been such that a good fire is apt to occur most anytime here and should make believers out of some of the oil companies. This is an area in which the wildland specialist should find a fertile field as far as fuel management programs are concerned and Bob Brendler is quite willing and interested to work on this type of project.

## YOLO COUNTY

Carl Schoner has the range responsibilities for Yolo County and because of his county director responsibilities he has not found time to put in as much effort on range improvement as he did earlier.

Jim Street has conducted a lot of experimental work in the county and has pretty well sorted out the varietal and fertility information necessary for good clover establishment. Most of this information is in Jim Street's file. There is good potential for clover establishment on the marginal grain land and low elevation foothills on the west side of the county.

A phosphorus rate sulfur trial has been planted on the Rominger Ranch north of the Yolo Fliers Club and should be far enough along to harvest next growing season. A good stand of Sub clover has been established on the area but because of low rainfall it did not produce sufficient growth to harvest this year. The south half of the plot has been fenced since it was planted and has not been grazed. The best stand of clover is in the north half of the plot which has been subject to continuous grazing. The fence should be flipped sometime between now and February 1, 1973 so that the north half of the plot will have sufficient chance to grow so it can be harvested and produce meaningful results in the spring of 1973. Gene Stiles is familiar with this plot and aware of what needs to be done with it.

YUBA COUNTY

The range work in Yuba County is done by Chuck Wilson from Sutter County and the programs in operation here have been discussed under Sutter County.