

Appropriations and Staff, 1945-47.

The appropriation to the Board was increased to \$153,175.00 for the 1945-47 biennium, in anticipation of requirements for compact negotiation on the Arkansas River. The engineering staff reached a maximum of 10 with 3 returns from military service. However, the number of engineers dropped to 5 in the second year, following further resignations for better salaried positions.

Surveys of reservoirs in Jackson County were made, and the annual check of irrigated acreage commenced in compliance with the decree on the North Platte River.

An engineering committee to advise Arkansas River Compact Commissioners was participated in by the staff.

Official State comments were prepared on a comprehensive report on the Colorado River by the Bureau of Reclamation. As a result of the report, a Compact Commission for the Colorado River was set up. The Board Staff also did considerable work for an engineering advisory committee in this basin similar to the one for the Arkansas River. Considerable amounts were expended in compensation of compact commissioners for the latter stream, in addition to normal consulting fees.

Funds available for expenditures other than personal were greater in this biennium than for any of the years except the first two of organization of the department.

Appropriations and Staff, 1947-49

The appropriation for the next two fiscal years, 1947-1949, for regular purposes of the department, was increased to \$175,000.00. This increase was principally to cover the services of compact commissioners, the two years having the highest expenditures for personal services, in addition to the regular staff, of any previous biennium. Funds available for other operating expenses were comparable with those of the preceding biennium. The Arkansas and Colorado compacts were consummated during this two-year period.

Appropriations and Staff, 1949-51; Project Report Reviews.

The appropriation was cut to \$146,000.00 for the

1949-1951 biennium. By this time the engineering staff consisted of 5 men, at which number it has remained to date.

As previously stated, review of all reports on proposed Federal projects is required of the department. These reports are the result of years of effort on the part of the Federal agencies. When the reports are received in the Board office, comments are requested within a 90-day period.

The information of the Board office is to be used in the preparation of the annual report to the Congress and in the preparation of the annual report to the President.

With a small staff, a detailed review and check is practically impossible in that time. The importance of such reviews is emphasized by the results which have been accomplished on two projects, through State criticism and suggestions. The proposed design of the Platoro Dam was modified to secure a saving of several million dollars to the water users. A similar result is in the process of being realized with respect to the proposed Wagon Wheel Gap Dam. Thorough studies of these projects were possible only through the assistance of the consulting engineer and his staff, and assistance to such an extent is not practicable in the case of many of the projects.

Budget requests for appropriations to enable the employment of two additional engineers have been disapproved on several occasions.

#### Appropriations and Staff, 1951 to Date.

In the years since July 1, 1951, in addition to the work required by such reviews, the staff of the Board has participated actively in hydrologic studies for the Arkansas-White-Red Basins Interagency Committee. Studies were also necessary with regard to the modification of the North Platte decree, and for negotiation on a modification of the Laramie River decree. Work has also been required on engineering studies relative to the operation of John Martin Reservoir under the Arkansas River Compact; and for the information of the Policy and Review Committee set up for the consideration of storage on the Gunnison River in connection with the Upper Colorado River Storage Project.

The 1953 session of the Legislature placed the licensing of water-well drillers and underground water development in the hands of the Board. This duty has required about one-half time of a staff member. The law made no provision for paying technical help. Income from fees is only sufficient to employ a clerk.

Appropriations for the past three fiscal years have been progressively increased only in the amounts necessary to meet automatic salary increases necessary to maintain this minimum staff.

Funds for expenditures other than personal services have remained for a number of years at practically the same level as for 1939-1940, in spite of the greatly increased costs of travel, supplies and services.

If the staff is to adequately perform the functions for which the Board is responsible, it is imperative that additions to the engineering staff be made possible.

The attached tabulation shows details of expenditures for personal services from July 1, 1937 to date.

R. M. Gildersleeve  
Chief Engineer

Ivan C. Crawford  
Director

COLORADO WATER CONSERVATION BOARD  
Personal Services Expenditures

	<u>Expended for Personal Services</u>	<u>Total Ap- propriation (a)</u>
<u>1937-38:</u>		
Director, 9 to 11 Engineers	\$ 26,322.79	
Temporary and seasonal - 17 men on North Park & Uncompahgre Investigations	4,573.34	
Part time salaries for 9 to 12 men on statistical work under Planning Com- mission direction.	8,645.87	
2 to 3 Stenographers	3,259.24	
Consulting Engineers' fees (2)	4,930.30	
Consulting Attorney's fees (3)	3,169.57	
	\$ 50,901.11	\$ 102,500.00
<u>1938-39:</u>		
Director, 13 to 14 Engineers	33,926.26	
Temporary and seasonal - 1 to 4 men on Uncompahgre investigation, 1 to 3 men on North Park investigation	5,051.26	
Part-time salaries - 12 to 16 men on statistical work under Planning Com- mission direction	10,936.19	
3 to 4 Stenographers	4,387.31	
Consulting Engineers' fees (2)	5,539.86	
Consulting Attorney's fees (1)	3,000.00	
	62,840.88	102,500.00
<u>1939-40:</u>		
Director, 14 to 17 Engineers, 1 observer (evaporation station)	37,553.11	
Temporary and seasonal - 1 man on Uncompahgre investigation, 2 men on North Park investigation, 3 to 6 men on mapping of irrigated lands.	2,601.66	
1/3 salary - Sec'y. Rio Grande Com- pact Commission	433.32	
Part-time salaries for 6 months - 4 to 14 men on statistical work under Planning Commission direction	3,095.38	
4 Stenographers	4,967.26	
Consulting engineering fees (1)	3,100.00	
Consulting attorneys' fees (2)	3,500.00	
	55,250.73	75,000.00

(a) For all purposes except administration of Arkansas and Upper Colorado  
 Compacts, and cooperative ground water investigations.

<u>Expended for Personal Services</u>	<u>Total Ap- propriation (a)</u>
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1940-41:

Director, 12 to 15 Engineers, 2 ob- servers and gage readers	35,205.47	
Temporary and seasonal - 1 to 3 men checking Laramie River diversions -under State Engineer's direction	1,380.00	
1/3 salary - Sec'y. Rio Grande Com- pact Commission	933.30	
3 to 4 Stenographers	4,821.78	
Consulting Engineer's fees (1)	3,565.00	
Consulting Attorneys' fees (4)	6,185.00	
	<u>52,090.55</u>	\$ 75,000.00

1941-42:

Director, 11 to 13 engineers, 2 observers and gage readers	35,650.41	
4 Stenographers	5,550.64	
Consulting Engineers' fees (2)	3,415.27	
Consulting Attorneys' fees (4)	9,037.50	
	<u>53,653.82</u>	75,000.00

1942-43:

Director, 9 to 11 engineers, 1 observer	31,276.01	
3 to 4 Stenographers	5,409.73	
Consulting Engineers' fees (3)	3,705.00	
Consulting Attorneys' fees (4)	10,114.30	
Temporary helpers - 2 for 2 months	270.40	
	<u>50,775.44</u>	75,000.00

1943-44:

Director, 10 engineers, 1 observer	34,280.04	
3 Stenographers	5,340.00	
Consulting engineers fees (1)	1,005.00	
Consulting Attorneys' fees (5)	7,716.53	
	<u>48,341.57</u>	70,000.00

1944-45:

Director, 8 to 9 Engineers, 1 observer	30,792.46	
3 Stenographers	5,340.00	
Consulting Engineers' fees (2)	3,913.73	
Consulting Attorneys' fees (7)	8,136.79	
	<u>48,182.98</u>	70,000.00

	<u>Expended for personal Services</u>	<u>Total Ap- propriation (a)</u>
<u>1945-46:</u>		
Director, 8 to 10 Engineers, 1 observer	\$ 31,756.27	
2 to 3 Stenographers	5,581.10	
Consulting Engineer's fees (1)	2,062.50	
Consulting Attorneys & Compact Com- missioners (6)	7,000.40	
	<u>46,400.27</u>	\$76,587.60
<u>1946-47:</u>		
Director, 5 to 8 Engineers, 1 observer	28,059.39	
Temporary helpers - 3 man months	322.50	
2 Stenographers	4,120.91	
Consulting Engineer's fees (1)	5,280.00	
Consulting Attorneys' & Compact Com- missioners (4)	10,800.00	
	<u>48,582.80</u>	76,587.60
<u>1947-48:</u>		
Director, Adm. Ass't., 5 to 8 engineers, 1 observer	35,756.87	
2 to 3 Stenographers	5,768.02	
Consulting Engineers Fees	4,200.00	
Consulting attorneys & Compact Commissioners (4)	10,386.66	
Temporary helpers - 3 man months	362.50	
	<u>56,474.05</u>	87,500.00
<u>1948-49:</u>		
Director, Adm. Ass't., 5 to 6 engineers, 1 observer	31,912.23	
3 Stenographers	6,882.42	
Consulting Engineers fees (3)	6,900.00	
Consulting Attorneys' fees (5)	14,015.87	
	<u>59,710.52</u>	87,500.00
<u>1949-50:</u>		
Director, Adm. Ass't., 5 engineers, 1 observer	32,528.78	
Librarian - Organizing library - 7 months	1,250.00	
3 Stenographers	7,820.83	
Consulting Engineer (1)	6,000.00	
Consulting Attorney (1)	6,000.00	
	<u>53,599.61</u>	73,000.00

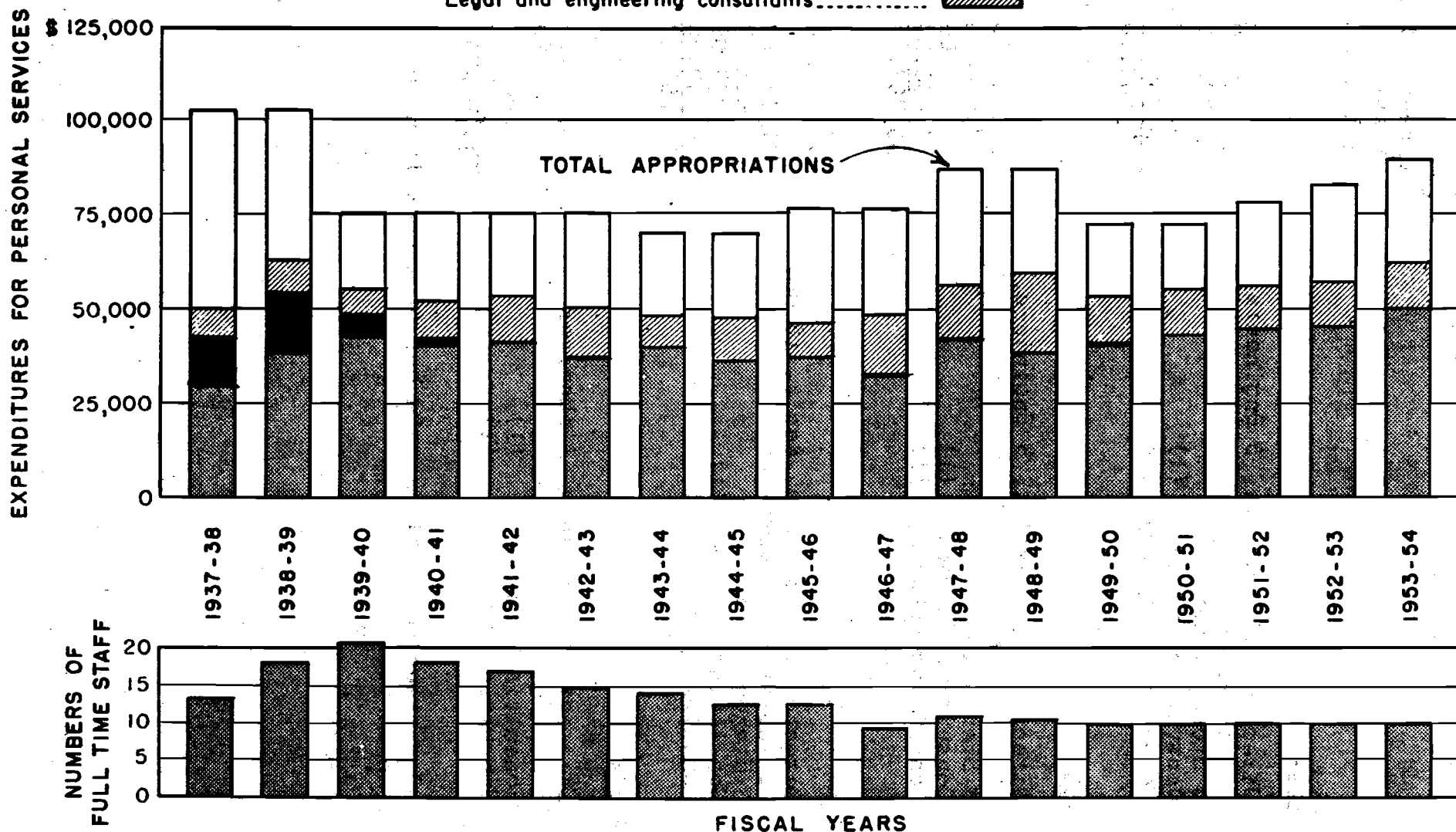
	<u>Expended for Personal Services</u>	<u>Total Ap- propriation (a)</u>
<u>1950-51:</u>		
Director, Adm. Ass't., 5 Engineers, 1 observer	35,122.50	
3 Stenographers	8,229.78	
Consulting Engineer (1)	6,000.00	
Consulting Attorney (1)	<u>6,000.00</u>	
	55,352.28	\$ 73,000.00
<u>1951-52:</u>		
Director, Adm. Ass't., 5 Engineers, 1 observer	37,322.00	
3 Stenographers	7,466.84	
Consulting Engineer (1)	6,000.00	
Consulting Attorney (1)	<u>6,000.00</u>	
	56,788.84	78,436.75
<u>1952-53:</u>		
Director ( 9 mo.) Adm. Ass't. (8 mo.) 5 Engineers, 1 observer	37,443.63	
3 Stenographers	7,811.47	
Consulting Engineer (1)	6,000.00	
Consulting Attorney (1)	<u>6,000.00</u>	
	57,255.10	83,274.00
<u>1953-54:</u>		
Director, 5 Engineers, 1 observer	38,612.00	
*4 Stenographers	11,746.90	
Consulting Engineer (1)	6,000.00	
Consulting Attorney (1)	<u>6,000.00</u>	
	62,358.90	90,000.00

\*Includes one clerk; salary paid out of income from Well Drillers' license fees.



# COLORADO WATER CONSERVATION BOARD PERSONAL SERVICES EXPENDITURES

Regular full time staff .....  
 Temporary (professional & subprofessional)...  
 Legal and engineering consultants.....



## CONTACTS WITH FEDERAL DEPARTMENTS AND COMMITTEES

For the efficient conduct of business, it is necessary for the Director, Consulting Attorney and Consulting Engineer of the Colorado Water Conservation Board to meet with individuals and committees mentioned below. There is, of course, a continual interchange of ideas by letter and telephone.

### A. Bureau of Reclamation.

Irrigation Projects; Multipurpose projects such as Upper Colorado River Storage Project, etc.

- a. Commissioner W. A. Dexheimer, Washington, D. C.  
Infrequently, probably twice a year.
- b. N. B. Bennett, head planning division, Washington.  
Two or three times a year.
- c. O. E. Larson, director Region 4, Salt Lake City.  
Six or eight times a year. Telephone and letters - frequently.
- d. R. J. Walter, director Region 7, Denver, Colorado.  
Six or eight times a year.
- e. H. E. Robbins, director Region 5, Amarillo, Texas.  
Two or three times a year.
- f. J. R. Riter, Chief Planning Engineer, Denver, Colorado.  
Twelve or fourteen times a year, Telephone conservation two or three times a week.

### B. Corps of Engineers, U. S. Army.

Flood control; navigation; multipurpose projects.

- a. District office at Albuquerque.  
Two or three times a year.
- b. District office at Los Angeles.  
Three or four letters per year.
- c. Omaha District Office.  
Two or three times a year.
- d. Area office, Denver Federal Center, Denver, Colorado.  
(Officers change frequently, therefore names not given.)

C. U. S. Geological Survey Office in Denver. (Denver Federal Center).

Colorado matches funds with U. S. Geological Survey in the measurement of surface water run-off and underground water studies.

- a. Francis Bell, district engineer, surface water.  
Six or eight times a year.  
Almost weekly contacts between Water Board office and him.

- b. Thad McLaughlin, district geologist, groundwater.  
Probably 15 or 20 contacts per year.

D. Soil Conservation Service, Department of Agriculture.  
Kenneth Chalmers, Denver, Colorado  
Three or four times a year.

E. Congressional Committees, Washington, D.C.

- a. House subcommittee on Interior and Insular Affairs.  
Appear before committee when it considers water problems affecting Colorado and inter-mountain states. It is necessary to attend hearings regardless of whether or not the director makes a statement in order that he may keep informed.

Attendance at this hearing will usually take at least a week to ten days per year.

- b. Appearance before subcommittee on appropriations for Interior and Insular Affairs to support Interior Department requests for investigational funds.

It is important that investigational funds be appropriated in sufficient amount to make studies of western potential irrigation projects. Attendance before this committee will usually consume four days annually.

- c. Senate Subcommittee on Interior and Insular Affairs.  
Attendance to hear testimony and on occasion to make a statement. If the project is important to Colorado it may be necessary to remain in Washington throughout the hearings and assist the Senators in planning the presentation of statements.

Time consumed - a week to ten days annually.

- d. Senate Subcommittee on Appropriations for the Interior Department. It is necessary to appear before this Committee when the House of Representatives has cut appropriations so as to materially affect state and western interests.

Time required: four to six days annually.

F. Colorado Members of Congress.

The Office of the Water Conservation is almost continuously in contact with offices of our Colorado Senators. Frequently they ask for assistance in analyzing bills having to do with water development policies. Also, they frequently request interpretation of Water Board actions.

There is also occasionally correspondence with Colorado members of the House of Representatives.

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The attorney for the Board and the consulting engineer are frequently called upon to make statements before Congressional Committees.

G. Basin Inter-Agency Committees.

- a. Arkansas-White-Red River Basins Inter-Agency Committee. This is a committee composed of federal representatives from the Department of Agriculture, Department of the Army, Department of Commerce, Department of Health, Education and Welfare, Department of the Interior, the Federal Power Commission and representatives of the Governors of the states located in these basins.

The Committee meets monthly and during the past two years has produced "A Plan for the Development, Use, and Conservation of the Resources of the Arkansas Basin in Colorado."

The chief engineer of the Water Board has spent a large portion of his time in assisting in the preparation of this report. The office of the Board has been charged with the duty of coordination of the several agencies within the state of Colorado. It is expected that the final plan will be issued within the coming fiscal year.

- b. Missouri Basin Inter-Agency Committee is also made up of the representatives of Federal Departments as noted above and the Governors of states or their representatives. Meetings are held once a month.

### LIBRARY MATERIALS

As a part of its working equipment the Board has brought together in its library several hundred volumes bearing on water resource problems, Supreme Court cases, Corps of Engineer, U. S. Army yearly report, Natural Resources Planning reports and a rather complete file of the U. S. Geological Survey surface water publications. In addition, it possesses extensive files containing reports on projects within the State and surrounding states. In these files there is also to be found, in many cases the raw data on which the reports are based.

#### Partial List of Reports Available

Cliffs-Divide	Pine River Extension
Gunnison River	Florida
San Miguel	Smith Fork
Dolores	Silt
Fruitgrowers Dam Extension	Paonia
Blue South Platte	Fryingpan-Arkansas
Collbran Project	Colorado Big-Thompson
Colorado River Storage Project	Pine River
and Participating Projects	Mancos
Fruitgrowers Dam	

#### San Luis Valley, Conejos Division

John Martin Dam  
Cherry Creek Dam

For obvious reasons, where there is only one copy of a report available in the files it is not permissible to take the report out of the Board's office.

In several cases the discussions which accompanied the formation of water compacts are available.

Copies of the compacts in which Colorado has an interest will be found in "Interstate Compacts", a copy of which accompanies this report. Also, a copy of the Cliffs-Divide Report and a copy of Senate Document No. 106, 82nd Congress, 2nd Session entitled Fryingpan-Arkansas Project, accompanies this report.

**APPENDIX C**

**COLORADO NEEDS**

**GROUND-WATER LEGISLATION**

**A Paper By**

**W. E. Code, Associate Irrigation Engineer**

**Colorado Agricultural Experiment Station**

**Colorado A and M College**

**Colorado Agricultural Experiment Station**

**General Series Paper No. 560**

## COLORADO NEEDS GROUND-WATER LEGISLATION 1/

In spite of its rather trite usage, the term lifeblood as related to water, needs to be brought to the public attention continually. The chaos that follows the failure of a town's water supply has been forcibly drawn to our attention during this recent drought and other droughts not so long ago. Cities of large size of course can reach out a hundred miles for water and feel fortunate in acquiring a supply at even that distance. This is not always possible for individuals and small communities. Small towns dependent on ground-water supplies are very numerous throughout the West and this is equally true in the humid East. The continued availability of good quality ground water is a matter of great importance to the economy of such communities. Its flexibility with regard to increasing rate of use is a limit on population, industry and beautification.

The greatest use of ground water is in irrigation. California was the first state to make extensive use of ground water for this purpose followed by Arizona and New Mexico. Colorado's history of ground-water development starts about 1888, but was of no importance until about 1915. It has had a phenomenal growth since the drought of the 1930's. In Texas, according to the 1950 U. S. Census, the area irrigated from wells increased 1,680,000 acres between 1940 and 1950, placing it second in rank in irrigated area. California ranks first and Colorado, formerly second, now occupies third place in total irrigated area. Irrigation in the humid areas of the East is gaining in favor and it can be expected that ground water will be an important source for this purpose.

The increasing use of ground water throughout the West is phenomenal, in fact alarming. Texas has been mentioned as outstanding, other states, Nebraska and Arizona for instance, have shown remarkable gains in the last 10 years. According to the 1950 Census, Colorado had 654 pumped irrigation wells in 1930, 2,878 in 1940 and 4,988 in 1950. Of these in 1950, 827 were in the San Luis Valley, 739 in the Arkansas Valley and 3,335 in the South Platte Valley. The remaining few are in the high plains area. In addition to this agricultural demand, all the eastern municipalities in Colorado, except those along the base of the mountains, derive their water supplies from wells. It is quite obvious that this competition for water is likely to cause a disturbance of the water table, especially where it is concentrated.

This development has come about without regard to the adequacy of the supply. In fact, it probably would have made no difference if the safe yield could have been determined in advance. People will take what they conceive to be their share, a trait for which they cannot be blamed, but in numerous cases, this has resulted in a serious situation. These ground waters are much too important to Colorado's economy not to have full information on their location, the quality and nature of the geologic formations in which they occur. From such data, prospective purchasers of pumping plants may gain some knowledge of the probable security of their investments. The surface water supply of the State is carefully measured and apportioned among users according to their rights to use it. This has been a continuous activity

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1/ W. E. Code, Irrigation Engineer, Colorado Experiment Station, Colorado A and M College, Fort Collins.

on the part of our State Engineer since Colorado became a state. Adequate provisions were made in our constitution and in the body of laws that followed as to how the surface water would be apportioned. They have been reasonably satisfactory but it took a critical situation in the Cache la Poudre Valley in the early days to determine the manner in which this should be done. Similarly, there is a very definite need for information and legislative guidance on ground-water supplies.

The natural physical laws governing the flow of ground water are quite different than those for surface flows. A different approach is needed. The difficulty is that we can't see what is going on underground and must rely on general principles and assumptions to make quantitative determinations. This, the ground-water hydrologist can do with reasonably satisfactory results, but not with the same comparable accuracy as with surface streams. Given the financial means he can locate the bodies of water-bearing gravels, determine their extent, the direction of flow, the amount of water in storage and the quantity flowing past any particular section. He can locate the boundaries between ground water areas which are frequently required because of the lack of similarity in geology and extent of use. This is basic information necessary to understand the capabilities of our ground-water supply, and to provide a proper foundation upon which any proposed legislation might be framed. Investigations of this character are most efficiently conducted as a relatively small but continuing project with modest annual appropriations rather than under a highly intensive program of short duration. In the past, appropriations by the legislature for cooperation with the Ground-Water Division of the U.S. Geological Survey have been too small to make desirable progress.

Colorado A and M College has been collecting data on water table fluctuations since 1929. These have proved very useful in determining what areas are stable and those which are declining. Long-time records are needed to determine stability or rate of decline. The College also has made investigations of the ground-water conditions in certain areas in the past. In 1945, the Ground-Water Division of the U.S.G.S. was invited to come into Colorado to carry on an investigational program under a fund-matching arrangement. To date the State has spent about \$120,000 in this manner. Surveys were made of three large areas and of many local problems.\* Funds have been inadequate to publish some of the reports on results of completed surveys. Colorado has spent less than any comparable western state on ground-water surveys.

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\* The extent of accomplishments by the U.S.G.S. is available in mimeograph form from the Colorado Water Conservation Board.



### Colorado Conditions

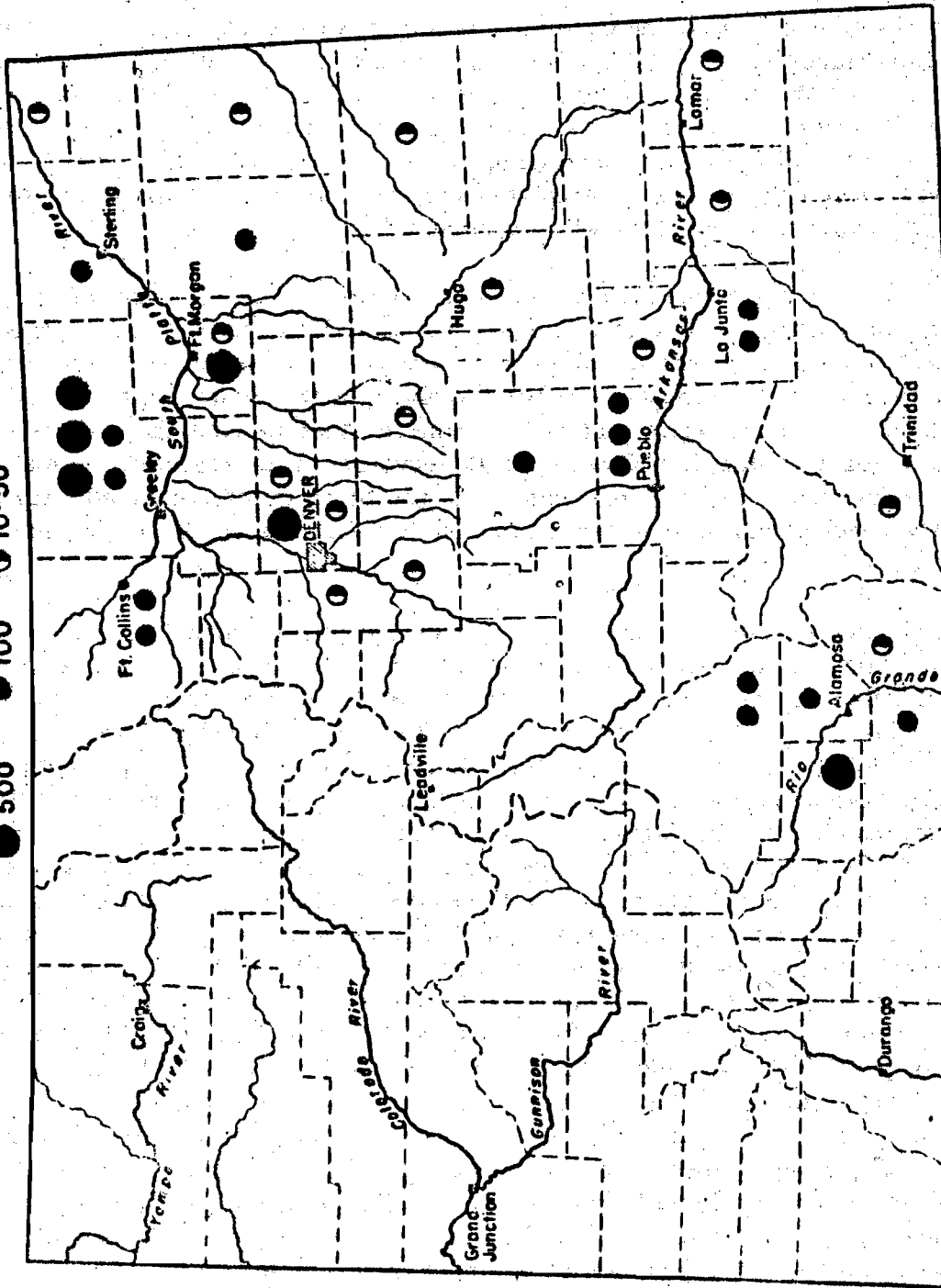
The greatest use of ground water in Colorado is in irrigation. However, the use by municipalities and individuals for domestic purposes is of equally great importance. Only those cities and towns near the east edge of the mountains have a surface-water supply. The remainder in the plains section depends on ground water. With the exception of a very few, these municipalities have had no serious difficulty in developing an adequate supply, however, the search for good quality water has complicated matters for some. All towns in the San Luis Valley are supplied with artesian water.

The accompanying map of the state shows the distribution of the approximately 5,000 irrigation wells according to the 1950 Census. The preponderance of these wells is in areas already under irrigation from surface sources and they serve as a supplementary water supply. In the South Platte drainage there are about 3,400 such wells and it is estimated that in 1953 they produced easily enough water to twice fill Horsetooth Reservoir. This reservoir holds 140,000 acre-feet of water. Thus, one can visualize their great combined capacity and their tremendous value as an instantaneously available supply to balance out shortages.

There is quite a large proportion of the total number of wells located along the dry tributaries of both the South Platte and the Arkansas Rivers. These furnish the entire irrigation supply for the lands served. Also in the plains section of the area drained by the Republican River and its tributaries, there are some 200 irrigation wells. The most important of the South Platte tributary areas are on the Box Elder north of Watkins, the area around and south of Wiggins on the Bijou, and on Beaver Creek south of Brush in Morgan County. There are small ground-water developments in the upper parts of Big Sandy Valley and Black Squirrel Creek which drain into the Arkansas River. Except for the Republican, these tributaries have flows only after substantial storms and therefore they are of no value as a surface irrigation supply. It is in such areas where concentrated pumping has exceeded the normal replenishment and water tables have been receding regularly each year. Whereas pumping areas under canal irrigation have a very good potential for replenishment for canal losses, the areas along stream courses which carry water only occasionally have to depend on such flows as a means of replenishment of the ground-water reservoir. At the present time an area just north of Watkins along the Box Elder, the Bijou Valley from Wiggins south for about 20 miles, and in the vicinity of Gary on Beaver Creek are all showing the serious symptoms of a constantly declining water table.

IRRIGATION WELLS IN COLORADO

● 500    ● 100    ○ 10-50



It is necessary to point out a very significant difference between the pumped areas along the dry streams and those along the streams carrying appropriated water. In the second case it would require no great stretch of the imagination to concede that an irrigation well might intercept water that would otherwise join the stream flow. The fact is well established that return flow is the result of the emergence of ground water flow at the ground surface. It is flowing towards those streams. An irrigation well operating within a mile of such an emergence conceivably might have an early and measurable effect upon that return flow.

Although the ground water in a normally dry surface tributary flows in the direction of and joins the ground water adjacent to the main stream in which there is appropriated water, there is a recognizable important difference in the opportunity for such a tributary flow to affect stream flow. The pumping areas along the tributaries are often many miles from the main stream. A reasonable velocity for ground-water movement would be three miles per year, hence, for a drop of water to move from a pumping field to a point of discharge into a stream would ordinarily be a matter of several years. During the elapsed time, losses from surface stream flow might make up for the loss in ground water storage due to pumping. Furthermore the normal net ground water contribution from tributaries to main stream surface flow is not very great. As an illustration, assume a ground-water flow two miles wide and 50 feet thick and having a slope of 20 feet per mile, then for an average character of gravel, the total discharge would be of the order of 10 cubic feet per second. Now if the water table is lowered 10 feet, the reduction in discharge would be about  $\frac{1}{5}$  of the total flow. In other words, the influence of remote up-stream pumping on main stream surface flow would be small indeed. The pumps are removing water stored in the ground centuries ago and the lowering of the water table is of much more importance between themselves than between them and surface water users. The point that the author is endeavoring to make here is that any legislation on ground water should take into account these differing conditions of sources.

Besides the restricted valley areas on tributaries there is another condition of ground-water occurrence to be considered. It is that represented by the plains area of the State and the San Luis Valley. In these instances the water table exists as a broad sheet of water between drainage channels many miles apart, in some places as much as 50 miles apart. Although the same laws of hydraulics apply to these waters, they are sometimes considered different legally than ground water confined to a valley. They may or may not be contributing water to living streams within the State.

### Legal Concepts on Use of Ground water

Many of our basic laws are naturally taken from the English common law. Among them are the rules regarding water, more important, surface water, as in the early days there were no conflicting ground-water usages. These rules applied to land through which a stream ran or bordered. The owner had a riparian right and could insist that the stream flowing through his property continue undisturbed as to quantity or undefiled in quality. It gave to the owner of the surface right ownership of the ground waters. In climates where the problem was more that of getting rid of water, this rule was not seriously questioned. Under irrigation from surface streams obviously it was inapplicable, and Western United States early in its irrigation history abrogated the English law for the Roman law which more nearly fitted its needs. The rule now followed is that of prior appropriation and had its inception in the mining regions. This rule states that the first appropriation of water to beneficial use has the first right. It was perfected under the leadership of the State of Colorado. Only California has attempted to straddle the issue by trying to apply both rules. Actual ownership of water where the common law has been abrogated lies in the state or the public. An individual can acquire only the right to use water beneficially. This right can be like real property in Colorado because it can be deeded to another, sold or transferred to other lands or uses. In Wyoming, however, it is definitely attached to a specific parcel of land. Also rights may be lost because of abandonment or lack of due diligence in maintaining facilities.

The common law was early applied to ground water. This rule began to change to the so-called American rule of reasonable use as far back as 1862 by a court decision in New Hampshire. It requires the owner of the overlying land to so use the ground water as not injure the rights of adjacent land owners. In California an extension of the American rule of reasonable use called the correlative right rule has been adopted. Under this rule each overlying property owner shares equally in the common source according to his surface ownership. There is nothing to prevent eventual depletion of the supply and those most favorable situated both as to position geographically and financially are the only ones likely to survive. Whereas, the American rule is none too definite because of the difficulty of defining reasonable use, the correlative rule in California is definite in stating that the transportation of water to distant lands may be considered unreasonable in times of shortage. In Utah another view is held on transported water based on its overall best use.

The rule of priority of appropriation of ground water has been adopted by several Western states. In general, the rules adopted have been based on

conceptions similar to those employed with surface waters but with numerous variations. Variations are to be expected because of the varying ground-water conditions, the temperament of the public and in some cases, constitutional provisions. It definitely can control the rate of withdrawal from a ground-water basin or district either through decisions by the administrator or by vote of the people. It can be employed in various ways to prevent an overdraft on the ground-water supply. It can be selective, that is, it need not be of equal force in all parts of the state. Pumping areas can be set up as districts with rules and regulations adopted which are not inconsistent with a basic state code.

### Legal Situation in Colorado

Colorado, not having specific statutes on ground water to be guided by, has had to rely upon rules laid down by the courts in the past. One of these, a Supreme Court Decision of wide importance, held that all groundwaters, which if not intercepted, would reach and become a part of some natural stream either on or beneath the surface, and are governed by and controlled by the terms of the constitution and statutes relative to appropriation, the same as the surface waters of such stream. In a subsequent decision it appears that the burden of proof lies with the one who claims that ground water is not tributary to a stream, to establish that fact.

There have been recent court decisions based more or less on previous ones that can be considered important. One, Safranek vs. Town of Limon, a Supreme Court decision, held that ground water flowing in the Big Sandy Valley was tributary to that stream and not percolating water and hence was subject to appropriation. It further held that "Colorado has departed from the common law as to ownership of percolating waters by surface owners-----." A later District Court decision in 1953 had to do with interference between users of artesian waters in the San Luis Valley. In this case a number of artesian well owners claimed that the operation of an irrigation well tapping the artesian flow caused their wells to cease to flow. The Court found in favor of the defendant and dismissed the complaint of the plaintiffs. In his decision the judge avoided the doctrine of appropriation and based it upon the American rule of reasonable use. It would indeed have been unfortunate in this case had the decision been based upon prior appropriation or on maintenance of lift. Further agricultural use of this water would have been stopped even though water was available to the plaintiffs by means of pumping.

Most important decisions both by lower courts and the Supreme Court have been wise in character and have in no way restricted ground-water development. In this we have been most fortunate. Yet there are certain situations as to ground-water use that definitely need clarification since in the minds of many of the legal profession much of the ground water use is, in theory at least, antagonistic to surface-water rights.

The most recent action by a District Court was that of an adjudication of 459 irrigation wells in Water Districts 3 and 1. In essence, the adjudication has the effect of applying the appropriation doctrine as between ground-water users. The possible effect of pumping on vested rights in stream flow is not entirely ignored but the conflict is resolved by applying the reasonable-use rule. In each of the decrees this statement or a similar one occurs: "The source of supply from which water is drawn and diverted is a district source of underground or subterranean water in subsurface strata underlying lands owned by the claimants and others from which water is pumped to the surface from the irrigation well of John Doe. Said water is drawn from beneath clay strata of said land, is not tributary to or a part of any known or natural stream and would not in natural course if left undisturbed in its natural condition appreciably augment the flow of any natural stream, and, except for that portion consumed by crops and evaporation, the water so released pumped and spread upon the land replenishes the water under said lands."

A surface appropriator, however, has recourse in the courts if he can show injury from pumping -- a most difficult thing to do in most cases. An adjudicated water right of course places the right holder under the administration of the State Engineer, whereas, under past conditions he had no jurisdiction. The whole matter caused much uneasiness and indecision among attorneys and well owners as to whether to come in or stay out. The result was that only a part of the owners had their wells adjudicated. Both sides now wonder what their status is.

A discussion on this adjudication was held in the 1953 convention of the Colorado Bar Association and a member\* is quoted in part:

"Months of study were devoted by irrigation attorneys to the advisability of entering irrigation wells in this adjudication. Many hours were spent on research and thought. We have an accomplished fact in our District in the awarding of independent priorities to this underground water - - - - -"

"There being no specific legislation or statutory law in this state fixing relative rights by the appropriators of subterranean waters, it is felt that Judge Coffin has extended the Appropriation Doctrine to these wells, construing the law of reasonable use into it. Too many times perhaps we attorneys are 'against' something because there is no precedent. Our

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common law has been built up by what has been done and how a thing has been done. This Decree attempts to harmonize practices of long standing in our District with the Appropriation Doctrine. This has been done without the necessity of an extensive underground water code. During the early phase of development in a ground-water area, the problems are largely those of individuals or small groups. Later they become of community or even statewide concern.

"A water code applicable to an entire state would reach to state lines. There are many outstanding differences between surface waters and underground waters. The law applicable to surface waters is very easy of administration -- in any portion of the state one diverts by a dam and a headgate. The water is visible. On underground waters we have an entirely different situation. We have nothing visible; we do not know the extent of the amount of water available for pumping; we have little information regarding recharge -- in other words, the study of underground water is a comparatively recent thing. Month by month we are by hydrological studies obtaining more information."

A decision is to be made by the people of Colorado whether to adopt a ground-water code or permit themselves to drift into a chaotic situation permitting a continuance of unresolved conflicts between users of both surface and ground water. Many other western states have already faced the problem and have adopted codes. Not always has this been a simple matter as for instance in the case of Arizona.

In 1948 the governor of Arizona kept the legislature in one special session after another until a code was adopted which later proved unsatisfactory. In 1953, their Supreme Court declared the code unconstitutional and a new one is to be considered in 1954. There is little doubt that the courts would welcome definite statutes to clarify the situation rather than depend upon previous decisions. The picture is a changing one. The tremendous investment made in the last 20 years in irrigation wells and the threat of exhaustion in some areas are potent factors calling for statutory definition of status and guidance for the courts.

### Past and Present Colorado Legislation

The need for specific ground-water legislation in Colorado has been realized for some time. In 1935 a bill was passed prohibiting pumping of artesian water if such pumping interfered with domestic use. It was so drawn as to apply only to the San Luis Valley and was never enforced. A comprehensive ground-water bill was prepared by the Colorado Bar Association in 1946. Since it did not have the unanimous support of the committee that prepared it and many outside the legal profession opposed it, the bill was not offered for consideration by the legislature. In the light of subsequent developments any new bill drawn would likely be of quite different character.

In 1950 the State Agricultural Planning Committee became interested in ground-water legislation and appointed a chairman whose duty it was to organize a sub-committee to study the situation. The services of Judge Clifford H. Stone, then secretary of the State Water Conservation Board, were enlisted to help this committee. Members were chosen from various parts of the State representing diverse conditions and interests. In addition to this representation, there were hydrologists, engineers and members from the legal profession. This committee met a number of times in 1950, 51 and 52. It did not accomplish much more than provide a sounding board for those with ideas. There was a great diversity of opinion ranging from several kinds of rules of control to none at all. It accomplished one definite thing, however. It formulated a bill for an act to control the drilling of artesian wells. This appeared urgent to many in the San Luis Valley where recent wells of large capacity were being drilled into the artesian sands. Several were not properly constructed nor controlled. This bill was introduced in the 1952 session of the legislature but was defeated. It was again introduced in the 1953 session after some objectionable features were amended. This time it was seized upon and very extensively revised to contain certain features of ground-water control. There seemed to be no debate over it and it passed without difficulty. It has many defects and is considered entirely inadequate and undesirable by the legal profession and many other competent persons. Among other things it places administration in the Colorado State Water Conservation Board, which is a policy-making agency. The State Engineer's office is the administrative agency on all other water matters. An uncertain device was proposed to permit the formation of ground-water districts. No appropriation was made to enforce it.

Recognizing that the Agricultural Planning Committee's sub-committee had no official status, it was decided to form another committee under the direction of the State Water Conservation Board with the Board's Director as chairman. The membership of the new committee is similar to the first



committee but its personnel is more uniformly representative of the State's interests. This committee started functioning in 1952. A technical sub-committee composed of geologists, engineers and well drillers and a legal sub-committee composed of attorneys were appointed. The technical committee in 1952 submitted a report which described the occurrence of ground water in the state, its present and probable future development, and problems to face. The committee was fortunate in having good data of a general character and in a few places excellent special data to work with. Much of the State, however, is still lacking in specific information. This report was handed to the legal committee which, because of the death of Judge Stone did not begin deliberations until January of 1954. It is the ambition of the committee to prepare a bill, acquaint the public with its contents for its reaction, and have it in readiness for consideration of the 1955 General Assembly.

The task of the legal sub-committee will not be an easy one. It will need to compose the conflicting opinions that exist in the various parts of the State because of the varying conditions. There are those places in the valleys of the stream courses where ground-water replenishment is assured through losses from irrigation. There are other pumping areas removed from those having irrigation water supplies brought in from stream flow, that have inadequate replenishment and where the water table is receding. Ground-water conditions in Colorado for instance, are quite different from those in Arizona and California. There the water-bearing formations are of great thickness while in Colorado they are relatively thin and underlain with impervious shale. Deepening our wells to keep up with a falling water table is out of the question. The users under these two quite different conditions will naturally have differing viewpoints as to legislative needs. If priorities are to be adopted, those near stream channels will not wish to have such priorities connected with those in stream flow. In fact such users prefer the status quo in that under present conditions they have not been disturbed. The other group feels that control in some form is needed among users from a limited source. What character of legislation that seems best suited and yet be constitutional, will require the combined best thinking of this group of competent attorneys.

No ground-water code is complete without control over the methods of constructing wells. The law of 1953 covered the construction of artesian wells fairly adequately and is very necessary to prevent waste and contamination. There is, however, room for improvement. It lacks control over domestic wells in general, most of which are not artesian in character. Proper methods of construction should fit into the requirements of the State

**Board of Health. Safeguards should be set up to prevent contamination of the ground-water from waste products and interchange between formations carrying good and poor quality water.**

**No ground water code is worth the paper it is written on unless there be funds appropriated to enforce it. It is hoped that this omission in the past will not be repeated. It would be most disheartening to those who are gratuitously giving of their time and talent, for their efforts to come to naught in this manner.**

APPENDIX D

Public Law 566 - 83d Congress  
Chapter 656 - 2d Session  
H. R. 6788

AN ACT

To Authorize the Secretary of Agriculture to cooperate with States and local agencies in the planning and carrying out of works of improvement for soil conservation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United State of America in Congress assembled, That erosion, floodwater, and sediment damages in the watersheds of the rivers and streams of the United States, causing loss of life and damage to property, constitute a menace to the national welfare; and that it is the sense of Congress that the Federal Government should cooperate with States and their political subdivisions, soil or water conservation districts, flood prevention or control districts, and other local public agencies for the purpose of preventing such damages and of furthering the conservation, development, utilization, and disposal of water and thereby of preserving and protecting the Nation's land and water resources.

SEC. 2. For the purposes of this Act, the following terms shall mean:

The "Secretary"- the Secretary of Agriculture of the United States.

"Works of improvement" - any undertaking for-

(1) flood prevention (including structural and land-treatment measures) or

(2) agricultural phases of the conservation, development, utilization, and disposal of water

in watershed or subwatershed areas not exceeding two hundred and fifty thousand acres and not including any single structure which provides more than five thousand acre-feet of total capacity. No appropriation shall be made for any plan for works of improvement which includes any structure which provides more than twenty-five hundred acre-feet of total capacity unless such plan has been approved by resolutions adopted by the Committee on Agriculture and Forestry of the Senate and the Committee on Agriculture of the House of Representatives, respectively. A number of such subwatersheds when they are component parts of a larger watershed may be planned together when the local sponsoring organizations so desire.

"Local organization" - any State, political subdivision thereof, soil or water conservation district, flood prevention or control district, or combinations thereof, or any other agency having authority under State law to carry out, maintain and operate the works of improvement.

SEC. 3. In order to assist local organizations in preparing and carrying out plans for works of improvement, the Secretary is authorized, upon application of local organizations if such application has been submitted to, and not disapproved within 45 days by, the



State agency having supervisory responsibility over programs provided for in this Act, or by the Governor if there is no State agency having such responsibility -

(1) to conduct such investigations and surveys as may be necessary to prepare plans for works of improvement;

(2) to make such studies as may be necessary for determining the physical and economic soundness of plans for works of improvement, including a determination as to whether benefits exceed costs;

(3) to cooperate and enter into agreements with and to furnish financial and other assistance to local organizations: Provided, That, for the land-treatment measures, the Federal assistance shall not exceed the rate of assistance for similar practices under existing national programs;

(4) to obtain the cooperation and assistance of other Federal agencies in carrying out the purposes of this section.

SEC. 4. The Secretary shall require as a condition to providing Federal assistance for the installation of works of improvement that local organizations shall -

(1) acquire without cost to the Federal Government such land, easements, or rights-of-way as will be needed in connection with works of improvement installed with Federal assistance;

(2) assume such proportionate share of the cost of installing any works of improvement involving Federal assistance as may be determined by the Secretary to be equitable in consideration of anticipated benefits from such improvements: Provided, That no part of the construction cost for providing any capacity in structures for purposes other than flood prevention and features related thereto shall be borne by the Federal Government under the provisions of this Act;

(3) make arrangements satisfactory to the Secretary for defraying costs of operating and maintaining such works of improvement, in accordance with regulations presented by the Secretary of Agriculture;

(4) acquire, or provide assurance that landowners have acquired, such water rights, pursuant to State law, as may be needed in the installation and operation of the work of improvement; and

(5) obtain agreements to carry out recommended soil conservation measures and proper farm plans from owners of not less than 50 per centum of the lands situated in the drainage area above each retention reservoir to be installed with Federal assistance.

SEC. 5. At such time as the Secretary and the interested local organization have agreed on a plan for works of improvement, and the Secretary has determined that the benefits exceed the costs, and the local organization has met the requirements for participation in carrying out the works of improvement as set forth in section 4, the Secretary is authorized to assist such local organizations in developing specifications, in preparing contracts for construction, and to participate in the installation of such works of improvement in accordance with the plan: Provided, That, except as to the installation of works of improvement on Federal lands, the Secretary shall



not construct or enter into any contract for the construction of any structure unless there is no local organization authorized by State law to undertake such construction or to enter into such contract, and in no event after July 1, 1956: Provided, That in participating in the installation of such works of improvement the Secretary, as far as practicable and consistent with his responsibilities for administering the overall national agricultural program, shall utilize the authority conferred upon him by the provisions of this Act: Provided further, That, at least forty-five days (counting only days occurring during any regular or special sessions of the Congress) before such installation involving Federal assistance is commenced, the Secretary shall transmit a copy of the plan and the justification therefor to the Congress through the President: Provided further, That any such plan (a) which includes reclamation or irrigation works or which affects public or other lands under the jurisdiction of the Secretary of the Interior, or (b) which includes Federal assistance for floodwater detention structures, shall be submitted to the Secretary of the Interior or the Secretary of the Army, respectively, for his views and recommendations at least sixty days prior to transmission of the plan to the Congress through the President. The views and recommendations of the Secretary of the Interior, and the Secretary of the Army, if received by the Secretary of Agriculture prior to the expiration of the above sixty-day period, shall accompany the plan transmitted by the Secretary of Agriculture to the Congress through the President: Provided further, That, prior to any Federal participation in the works of improvement under this Act, the President shall issue such rules and regulations as he deems necessary or desirable to carry out the purposes of this Act, and to assure the coordination of the work authorized under this Act, and related work of other agencies including the Department of the Interior and the Department of the Army.

SEC. 6. The Secretary is authorized in cooperation with other Federal and with States and local agencies to make investigations and surveys of the watersheds of rivers and other waterways as a basis for the development of coordinated programs. In areas where the programs of the Secretary of Agriculture may affect public or other lands under the jurisdiction of the Secretary of the Interior, the Secretary of the Interior is authorized to cooperate with the Secretary of Agriculture in the planning and development of works or programs for such lands.

SEC. 7. The provisions of the Act of June 22, 1936 (49 Stat. 1570), as amended and supplemented, conferring authority upon the Department of Agriculture under the direction of the Secretary of Agriculture to make preliminary examinations and surveys and to prosecute works of improvement for runoff and waterflow retardation and soil erosion prevention on the watersheds of rivers and other waterways are hereby repealed: Provided, That (a) the authority of that Department of Agriculture, under the direction of the Secretary, to



prosecute the works of improvement for runoff and waterflow retardation and soil erosion prevention authorized to be carried out by the Department by the Act of December 22, 1944 (58 Stat. 887), as amended, and (b) the authority of the Secretary of Agriculture to undertake emergency measures for runoff retardation and soil erosion prevention authorized to be carried out by section 7 of the Act of June 28, 1938 (52 Stat. 1215), as amended by section 216 of the Act of May 17, 1950 (64 Stat. 163), shall not be affected by the provisions of this section.

SEC. 8. There are hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act, such sums to remain available until expended.

SEC. 9. This Act may be cited as the "Watershed Protection and Flood Prevention Act".

Approved August 4, 1954.