HIGH PLAINS STUDY RECOMMENDATIONS -- OPTIONS FOR ACTION

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INTRODUCTION

The High Plains Study was designed to evaluate alternative futures (Management Strategies). The possible futures examined were baseline, voluntary water demand reduction-conservation, mandatory water supply reduction, and increasing the water supply. The researchers at NMSU developed a list of possible options for action that would help to make each of these futures possible.

The people attending the second session of the water conference were asked to respond as to their preference from the list of possible actions. In addition they were asked to indicate the degree with which they agreed or disagreed with each of the possible actions.

Described below are the possible actions considered by each of the possible futures.

POSSIBLE OPTIONS FOR ACTION

A. Baseline

1. "Business as Usual" - no action.

This alternative for action is the first alternative considered for any situation. It means that present conditions and policies will continue.

2. Establishment of an export promotion board.

A critical assumption of all the alternative strategies was that of crop prices. Since crop prices are closely tied to export demand, the establishment of a group to promote exports could help stabilize or increase crop prices.

3. Increased funding of agricultural research, demonstration, and extension.

A second critical assumption of all the alternative strategies was that of increasing crop yields. Much of the improvement in crop yields in the past has been the result of agricultural research. Federal and state spending for agricultural research is not keeping pace with inflation. Federal funding buys 30 percent less research now that it did 10 years ago, while state funding buys about 10 percent less research. Agricultural producers contribute to research when they buy inputs from companies with large research budgets or when they sell commodities with checkoffs earmarked for market promotion or agricultural research. Greater public and private financial support for agricultural research is a cost-effective way to increase agricultural yield. This alternative proposes that funding be increased to agricultural research, demonstration, and extension in order to help increase future crop yields.

4. Increase SCS technical and financial assistance in the Ogallala area.

The state conservationists from the U.S. Soil Conservation Service (SCS) in the six-state Ogallala region have requested that this region be targeted for increased technical and financial assistance to improve water and soil conservation practices. This assistance will be particularly important as thousands of acres in this region go from irrigation back to dryland production and rangeland. Additional personnel are also needed to help conduct on-farm irrigation efficiency tests and promote effective seasonal water management practices. At the federal level, the USDA Soil Conservation Service and Agricultural Stabilization Conservation Service should continue the current education and assistance programs. These programs can provide an excellent means of increasing the adoption rate of new technology via technical assistance from SCS and financial assistance via ASCS, These programs are informally directed by the priorities of the farmers in the area.

5. Continued funding for monitoring groundwater depletion and its effect.

Without updated knowledge of the rate of aquifer depletion and its effects, there is no information to plan for local exhaustion and domestic, municipal and industrial water sources.

B. Voluntary Water Demand Reduction -- Conservation

1. Accelerate research and demonstration of crops that produce more per unit of water.

This alternative for action would require the acceleration of crop breeding programs utilizing the latest (and most expensive) techniques such as genetic engineering and tissue culture reproduction. The goals of this program would be: (a) develop new varieties of existing crops that produce equal yield on less water or more yield on equal water, and (b) adapt "alternative crops" which are low water users to the climatic and physical conditions of the region. "Alternative crops" are low water use crops which have not traditionally been grown in the Ogallala region. Some possible alternate crops include: sunflowers, which require about half as much water as corn; gran amaranth, whose seeds yield a high quality protein and oil; and the Jerusalem artichoke, a starchy tuber suitable for human consumption or fuel alcohol use. A systematic inventory and analysis of alternate crops with both economic and adaptability potential is urgently needed -- not only for the High Plains but other areas of the state as well. In addition to determining whether such crops can be adapted and raised in the state, such studies must investigate problems and opportunities in processing and marketing alternate crops.

2. Establish ET (Evapotransporation) reporting stations.

With the help of local newspapers and radio stations, daily ET reporting stations could be established. Daily ET requirements are necessary for the establishment of low cost irrigation scheduling. Because rainfall and climatic conditions vary from place to place, this service chiefly benefits those within 30-50 miles of the reporting station. Establishing ET reporting stations would require a one-time cost of $3,000 to $5,000 for equipment for each station, plus modest labor and telephone costs for five months each year to read and transmit the ET information to cooperating newspapers and radio stations. Expenses could be cut if local organizations helped to operate these ET stations.

3. Accelerate research to determine the effect on crop yield of water application timing and amounts.

The determination of the timing and amounts of water necessary for "critical" stages of crop production is necessary before an irrigator can consider profitable supplemental irrigation. Before an irrigator can successfully eliminate an irrigation, and reduce water application by some amount, the knowledge of which irrigation has the least impact on crop yield, quality, and harvest considerations is necessary.

4. Expanded research and education programs to encourage irrigation scheduling.

Irrigation scheduling is among the best management techniques for significantly reducing water applications (up to 20 percent) while maintaining yield, at a relatively low per acre cost. Expanded research is needed to "localize" scheduling and include all crops. Increased educational programs are needed by both the public and private sectors to encourage its adoption and wide-spread use.

5. Accelerate research and education of water conserving irrigation system design.

Expand the programs in irrigation system design (moving trickle, low pressure center pivots, leveling, etc.) these efforts could save up to 20 percent of the water applications. At the private action level, some form of communication is needed between manufacturers and distributors of irrigation equipment and the Experiment Stations, Agricultural Research Service, Conservation Districts, and innovative farmers. For example, the Low Energy Precision Application (LEPA) system, developed and tested at the Agricultural Experiment Station in Lubbock, and other high efficiency systems developed and implemented by individual farmers, could be much more widely adopted if a mechanism existed for convincing manufacturers to produce and distribute these systems soon after they are tested and proven effective. Research institutions could test and compare existing and new equipment and distribute results to manufacturers, and to farmers in order to stimulate production of the most efficient equipment.

6. Establishment of low interest loan program for improved irrigation systems.

Establish low interest federal or state loans to encourage adaptation of water conserving technology. Local, state and federal governments should develop a source of loanable funds, available at interest rates below contemporary bank customer rates, to be used for purchase and utilization of water-conserving equipment. Tax incentives should also be urged to provide tax relief on water-conserving agricultural equipment. Exemption from property tax or taxing these items of property at a reduced rate at the local level is one possibility. The same effect could be achieved at the federal level via tax credits in a manner similar to energy-conserving tax credits currently available.

7. Increase Cooperative Extension Services support in irrigation system and water application education (additional area irrigation specialist).

The extension service now has a full-time agricultural engineer/irrigation specialist for the entire state handling both irrigation and farm machinery. Due to extension service budget cuts, there is an open position for an agricultural engineer. As pumping costs increase, water supplies decrease and new irrigation systems emerge, it will become more and more important to provide up-to-date, practical information at the farm level on methods to improve water use efficiency.

8. Increase testing, monitoring and education programs for pumping plant efficiencies.

The efficiency of the pumping plant has a significant impact on the amount of water pumped for the fuel utilized. As irrigation fuel prices increase in the future, a pumping plant operating at a "good" efficiency will operate on much less fuel and money. The expansion of an ongoing pump testing program has the potential for a tremendous fuel and money saving impact.

9. Initiate large scale research, demonstration, and education program on alternative irrigated farming techniques (minimum till, low pressure, trickle), partial irrigation farming, and improved dryland farming techniques.

The establishment of a farm-sized research unit to demonstrate new and improved cultural and irrigation techniques in farm conditions. This unit would place emphasis on the demonstration of water conserving irrigation technologies, and cultural practices for both full and partial irrigation levels, as well as improved dryland farming techniques. The unit would be designed and operated for demonstration and education purposes.

10. Initiate programs that will increase farmer cooperation on testing new technologies in a commercial farm condition.

The lack of commercial-scale research and demonstration projects is one of the chief obstacles to adopting more efficient methods of conserving water on High Plains farms. Any change in cropping patterns, cultivation practices, or irrigation methods is usually a major business decision. Because the financial stakes are so high, farmers tend to discount the relevance of research information developed from small plots of land.

11. Establish producer and agri-business funded research foundations.

The establishment of producer and agri-business funded research foundations has several advantages. First, it indicates the importance of the problem to state, regional, and national policy makers. Second, it enables high priority funding of research or specific local problems.

12. Establish a producer information network (price, education, new ideas, etc.)

With the advent of the affordable personal computer in conjunction with a WATS telephone line, it is now possible for the almost instantaneous transfer of information. This in conjunction with the public broadcasting networks (television and radio) could provide a huge amount of information to agricultural producers. This information could include producer price information, descriptions, and advantages of new technologies, research information, and notices of importance to agricultural producers.

13. Establish programs to assist farmers wishing to switch from irrigation to rangeland.

As the aquifer lowers, there will be cases where farmers wish to convert all or part of their irrigated acreage to grassland. A program should be established to encourage and aid in this process. This program could provide information on grass varieties and financial assistance in order to assure a smooth transition to rangeland.

C. Mandatory Water Supply Restrictions

1. Mandatory well spacing.

If this action alternative was implemented, it would require changes in or additional laws. This action alternative would mandate that there be no more than "X" active wells per section. This would have the effect of lengthening the aquifer life by controlling the number of wells.

2. Reduce allowable water withdrawals to less than 3 acre-feet per acre per year.

If this alternative was implemented, it would require changes in th present laws. In addition, this alternative would require monitoring of the water pumpage from each well and limiting pumpage to less than 3 acre-feet per acre per year.

3. Restrict crop water applications to a percent of their full requirement.

If this alternative was implemented, it would require changes or additions to present laws. In addition, this alternative would require monitoring of the water pumpage from each well and limiting pumpage to a percentage less than the full per acre water requirement (full ET) for each crop.

4. Require irrigation scheduling.

If this alternative was implemented it would require that farmers implement, for each crop, a scientific irrigation timing and quantity management technique. The farmer could do it himself or hire it done. This alternative would also require substantial changes to present laws.

D. Increase Water Supply (Importation and Management)

1. Continue interstate feasibility studies with emphasis on quantity, sources, timing and cost.

Interstate water importation feasibility studies would be continued with emphasis given to the determination of the amount and availability of surplus water in the basins and states of origin. The states of origin should be included in the institutional mechanism set up to conduct the study. Other studies for importing water to the High Plains region should be included in addition to the Corps of Engineers' analysis through the High Plains Study to import from the Missouri/Mississippi River system.

2. Study of feasibility of using alternative energy sources (wind, solar, etc.) to transport interstate and intrastate water.

(1) Study the feasibility and develop demonstration projects for using wind energy for: (a) transporting intrastate and interstate imported water; (b) irrigation water pumping; (2) study the feasibility of biomass fuels for transporting imported water; (3) monitor the development, perform feasibility studies and develop demonstration project for photovoltaic electricity production for irrigation water pumping; and (4) develop on-farm energy conservation demonstration and education program.

3. Study the feasibility of using playa lakes as a recharge water source or an irrigation water source.

Water which normally runs to playa lakes could be diverted to nearby cultivated areas, or the lake could be modified (pits) to provide increased deep percolation while reducing surface evaporation.

4. Expand the demonstration and education program to increase farm soil moisture availability from natural rainfall and snow.

Expand "on-farm" research and implementation programs to increase soil moisture availability from precipitation by such methods as water runoff management and new land treatment methods. Water that enters the soil and is surplus to plant needs will ultimately add to recharge of the underground aquifer. Increase and implement programs that expand land

treatment for non-cultivated areas (i.e., pitting, terracing, removal of phreatophytes and replace with grasses) and determine suitable aquifer recharge sites and carry out demonstration projects.

5. Expand the research effort into the utilization of saline water.

If crops can be made more salt tolerant, the possibility exists to either use straight saline water or mix saline and fresh water to increase local supplies.

RESULTS

The responses to the above list of possible options for action are summarized in the following section.

Of the registered attendance at the New Mexico Water Conference, about 55 percent responded to the survey. The composition of those responding to the survey is summarized in Figure 1. Residents of the Ogallala region of New Mexico accounted for 31 percent. Of those responding, 9 percent were agricultural producers in the Ogallala area and 22 percent were non-agricultural residents in the Ogallala area. Agricultural producers from outside the Ogallala area accounted for 12 percent of the total. Most of the respondents (57 percent) were not agricultural producers and were from outside the area.

The responses are summarized in Exhibit 1 with the numbers representing the percentage responding to the preference level. The responses are also summarized in Figures 2 through 5. Figure 2 summarized the responses for the baseline measures. Figure 3 for the conservation measures, Figure 4 for the mandatory measures, and Figure 5 for the importation measures.

There were some definite opinions expressed by the responding group regarding the options for action listed under the baseline strategy (Figure 2). The majority of the group (87 percent) disagreed with A-1 (no action). About 94 percent of the respondents agreed with A-5 to continued monitoring groundwater depletion, 85 percent agreed with A-3 to

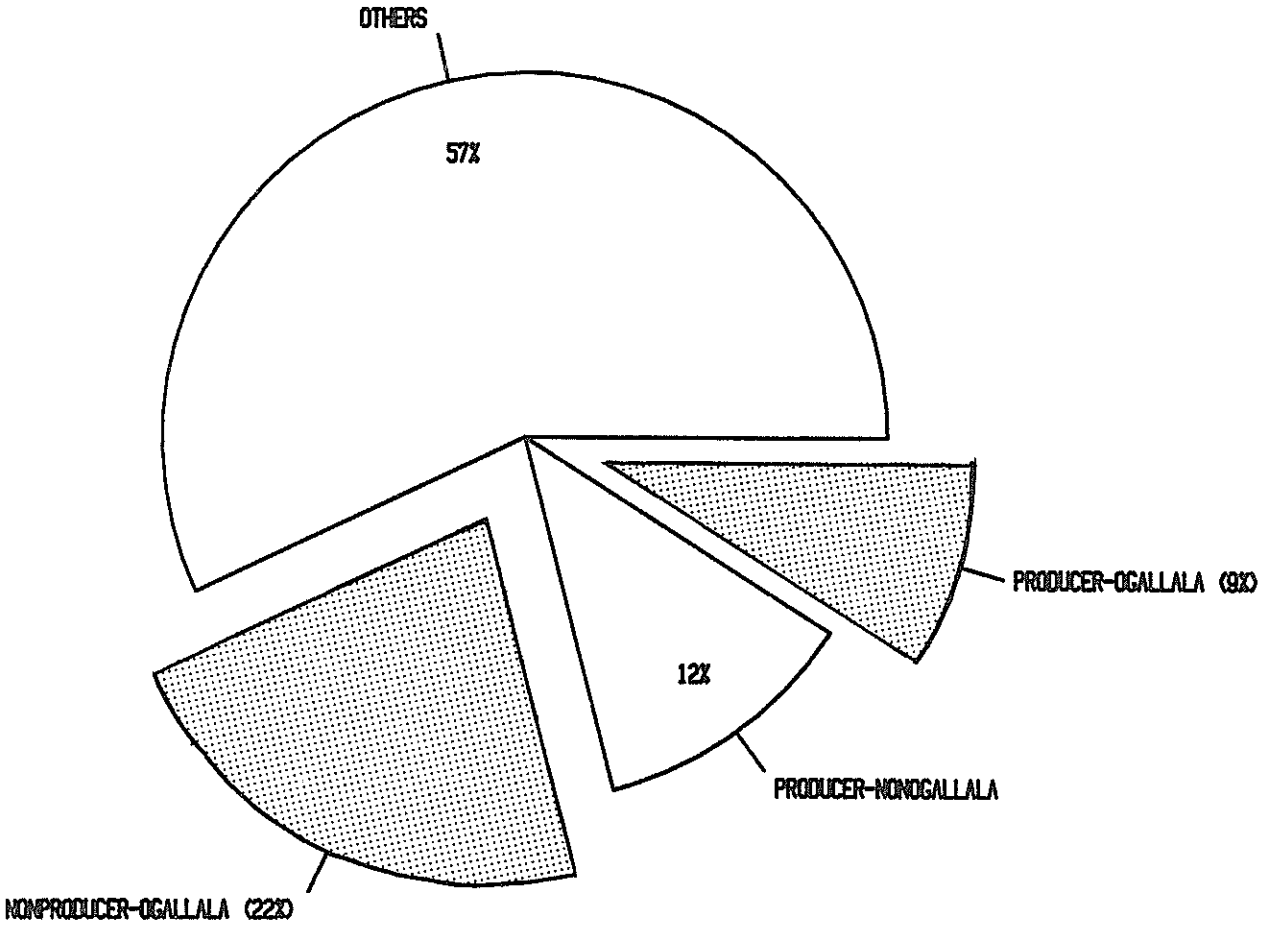

Figure 1. Composition of respondents to survey for options for action, New Mexico Water Conference, 1982.

HIGH PLAINS RECOMMENDATIONS
Responses from N.M. Water Conference, Clovis, N.M., 1982

YES NO

___ ___ I live in _____ County

___ ___ I live in the Ogallala Region of New Mexico

___ ___ I am a rancher or farmer

___ ___ I irrigate using Ogallala Aquifer Water

Please indicate the extent to which you agree or disagree with each of the following recommendations.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A. BASELINE					
1. "Business as Usual" -No action.	1	4	7	37	50
2. Establishment of an export promotion board.	10	34	37	18	1
3. Increased funding of agricultural research, demonstration, and extension.	28	57	14	1	0
4. Increase SCS technical and financial assistance in the Ogallala area.	10	57	28	8	0
5. Continued funding for monitoring groundwater depletion and its effect.	44	50	6	0	0
B. VOLUNTARY WATER DEMAND REDUCTION--CONSERVATION					
1. Accelerate research and demonstration of crops that produce more per unit of water.	44	51	5	0	0
2. Establish ET (Evapotrasporation) reporting stations.	17	64	18	1	0
3. Accelerate research to determine the effect on crop yield of water application timing and amounts.	35	55	9	1	0
4. Expanded research and education programs to encourage irrigation scheduling.	34	53	13	0	0
5. Accelerate research and education of water conserving irrigation system design.	37	57	6	0	0
6. Establishment of low interest loan program for improved irrigation systems.	20	45	20	12	3
7. Increase Cooperative Extension Services support in irrigation system and water application education (additional area irrigation specialist).	20	49	21	10	0
8. Increase testing, monitoring and education programs for purping plant efficiencies.	17	56	21	5	1
9. Initiate large-scale research, demonstration, and education programs on alternative irrigated farming techniques (minimun till, low pressure, trickle), partial irrigation farming, and improved dryland farming techniques.	31	49	10	9	1
10. Initiate programs that will increase farmer cooperation on testing new technologies in commercial farm conditions.	22	53	24	1	0
11. Establish producer and agri-business funded research foundations.	20	44	29	7	0
12. Establish producer information networks (price, education, new ideas, etc.).	21	49	27	3	0
13. Establish programs to assist farmers wishing to switch from irrigation to rangeland.	22	29	40	9	0
C. MANDATORY WATER SUPPLY RESTRICTIONS					
1. Mandatory well spacing.	15	27	25	25	8
2. Reduce allowable water withdrawals to less than 3 acre-feet per acre per year.	9	35	32	14	11
3. Restrict crop water applications to a percentage of their full requirement.	4	22	33	30	11
4. Require irrigation scheduling.	14	34	24	17	11
D. INCREASE WATER SUPPLY (IMPORTATION AND MANAGEMENT)					
1. Continue interstate feasibility studies with eaphasis on quantity, sources, timing and cost.	14	45	18	13	10
2. Study of feasibility of using alternative energy sources (wind, solar, etc.) to transport interstate and intrastate water.	15	42	21	13	9
3. Study the feasibility of using playa lakes as a recharge water source or an irrigation water source.	9	58	23	9	1
4. Expand the demonstration and education program to increase farm soil moisture availability from natural rainfall and snow.	23	66	8	3	0
5. Expand the research effort into the utilization of saline water.	27	62	8	3	0

Please indicate which three recommendations should have the highest priority (Example: A-1, B-7, C-4) B-1 A-5 D-9 D-5 /A-3

Of the four general strategies (A,B,C,or D) please indicate the one area where the major efforts should be directed. B

Please list other comments on back side.

Exhibit 1. Total responses from New Mexico Water Conference in percent, 1982.

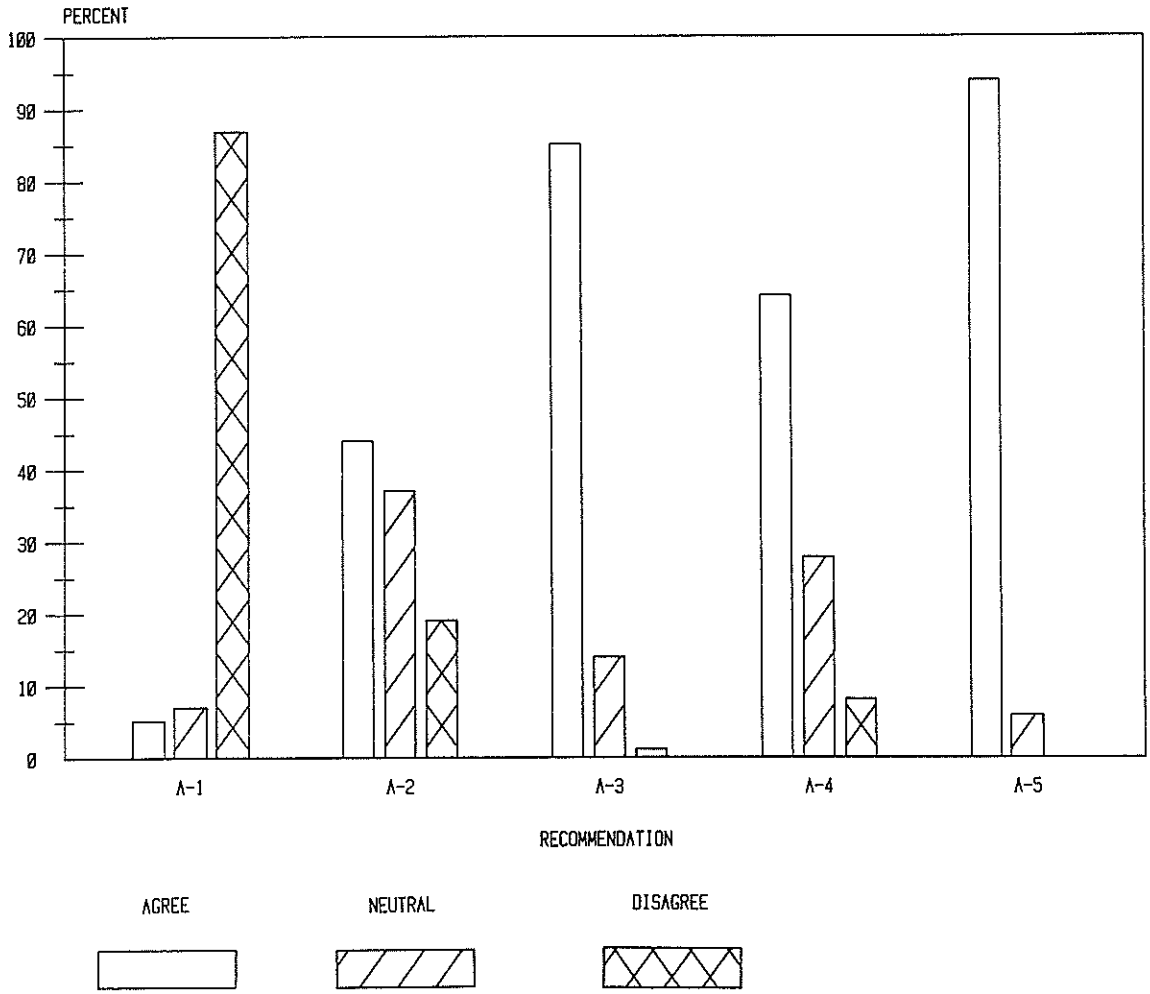

Figure 2. Recommendations for options for action for baseline measures, New Mexico Water Conference, 1982.

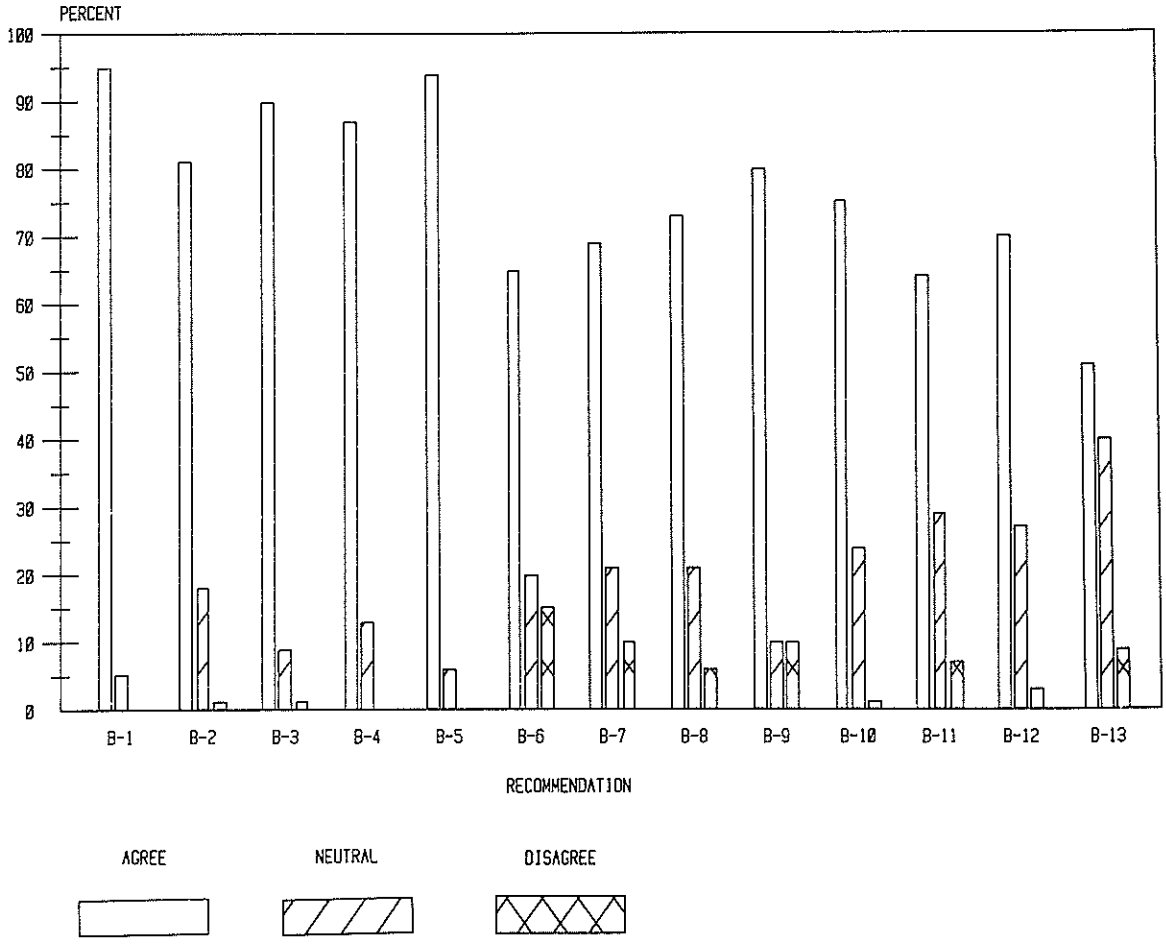

Figure 3. Recommendations for options for action for voluntary conservation measures, New Mexico Water Conference, 1982.

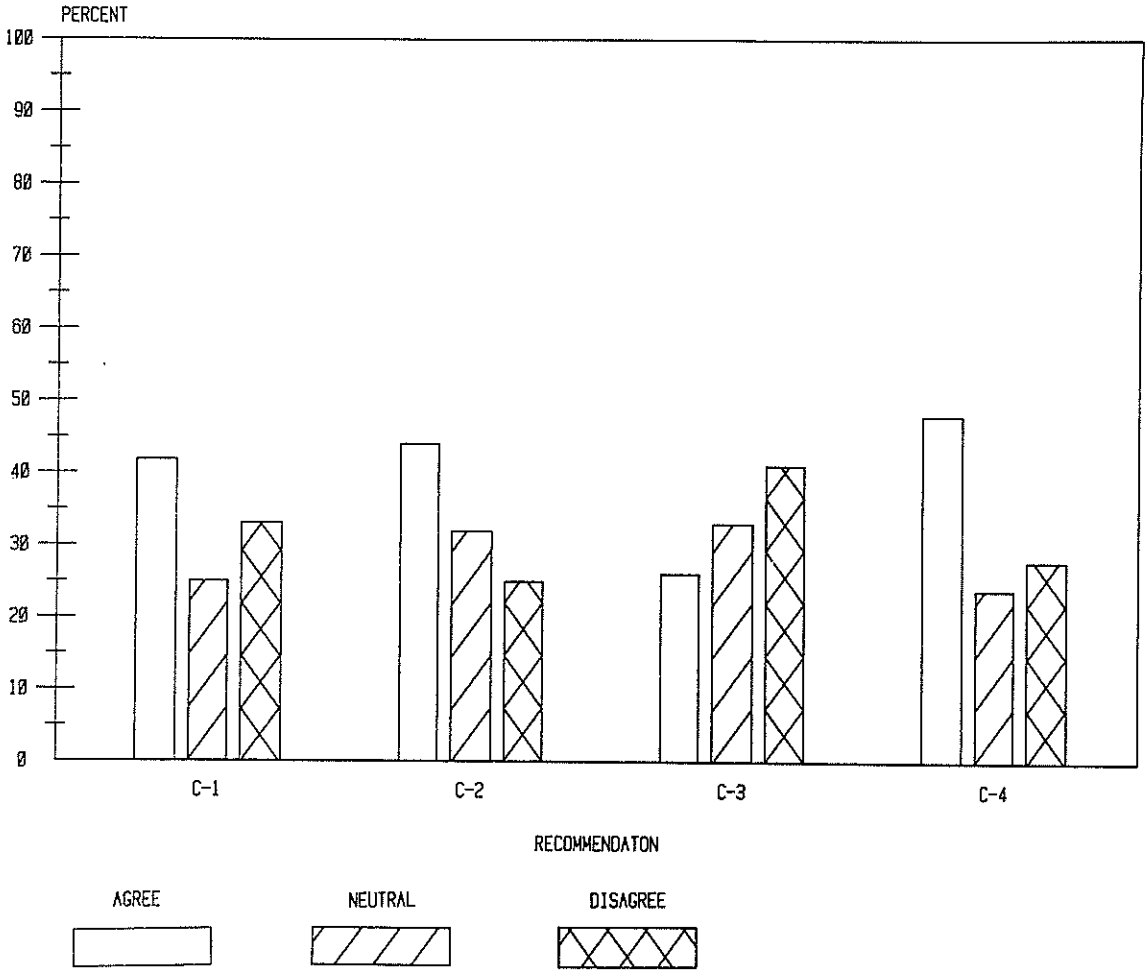

Figure 4. Recommendations for options for action for mandatory conservation measures, New Mexico Water Conference, 1982.

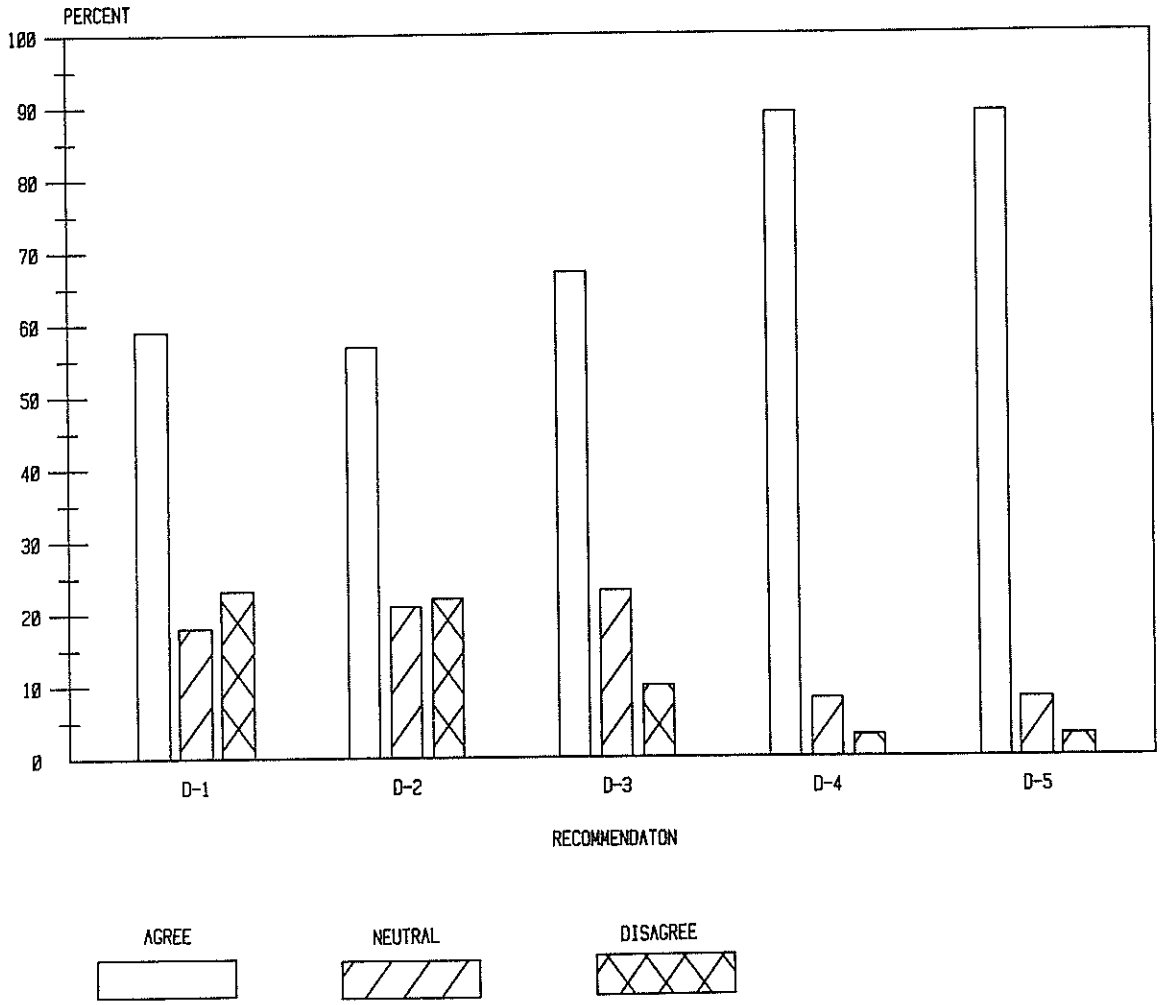

Figure 5. Recommendations for options for action for importation measures, New Mexico Water Conference, 1982.

increased funding of research, demonstration and extension, and 64 percent agreed with A-4 to increased SCS assistance.

The responses of the agricultural producers for baseline measures followed the total responses very closely for the most part. There were, however, a few notable exceptions. While only 44 percent of the total group agreed with A-2 for the establishment of an export promotion board, 79 percent of the agricultural producers agreed with this option.

All of the options for action examined under the voluntary strategy had a majority of the respondents in agreement (Figure 3). Option B-1 for crops that produce more per unit of water had 95 percent of the respondents in agreement, and B-5 for water conserving irrigation design had 94 percent. Other options for action receiving strong agreement were B-3 (water timing effects on yield), B-4 (irrigation scheduling), B-2 (ET reporting station), and B-9 (large-scale research and education farms) with 90, 97, 81 and 80 percent, respectively. With all the possible options for action under the Voluntary Strategy the agricultural producers were within 10 percentage points of the group total, except for B-10. On option B-10, which was to initiate programs that will increase farmer cooperation on testing new technologies in commercial farm conditions, 86 percent of the agricultural producers agreed with this while only 75 percent of the total respondents agreed.

None of the proposed options for action under the mandatory strategy received a majority either in agreement or disagreement. Slightly over 40 percent of the respondents agreed with C-1 (mandatory well spacing) and C-2 (reduce withdrawals to a percent of full). On all the possible options for action there were at least 25 percent with an opposing view and at least 24 percent that were neutral. A greater percentage of the agricultural producers were neutral on all the options except for C-1. Agricultural producers disagreed more strongly with option C-1, mandatory well spacing.

More than 50 percent of the respondents were in favor of all the options for action under the importation strategy. There were 89 percent in favor of both D-4 (soil moisture from natural methods) and D-5 (research saline water). Under the increase water supply strategy, 20

percent of the agricultural producers agreed with D-1, to continue studying the feasibility of interstate transfers, and 15 percent agreed with D-2, to study moving interstate and intrastate water with alternative energy sources.

The four options for action the respondents listed as having priority were B-1, A-5, B-9, and D-5 tied with A-3 (Exhibit 2). These options for action were selected by asking each respondent to indicate his top three priority options. The B-1 option, to accelerate research and demonstration of crops that produce more per unit of water, was selected most. Option A-5, to continue funding for monitoring groundwater depletion and its effect, was second. B-9, to initiate large-scale research, demonstration, and education programs on alternative irrigated farming techniques (minimum till, low pressure, trickle), partial irrigation farming, and improved dryland farming techniques, was third. Options for action D-5, to expand the research effort into the utilization of saline water, and A-3, to increase the funding of agricultural research, demonstrations, and extension, tied for fourth place.

Of the four general strategies considered: A-baseline, B-voluntary water demand reduction -- conservation, C-mandatory water supply restrictions, and D-increase the water supply (importation and management), the strategy recommended where major efforts should be directed was B or voluntary water demand reduction -- conservation. About 85 percent of those responding selected this measure as the guiding policy (Exhibit 2).

	Priority options for action (percent)	Priority general strategy (percent)
A. BASELINE		4
1. "Business as Usual" -No action.	2	
2. Establishment of an export promotion board.	2	
3. Increased funding of agricultural research, demonstration, and extension.	7	
4. Increase SCS technical and financial assistance in the Ogallala area.	2	
5. Continued funding for monitoring groundwater depletion and its effect.	9	
B. VOLUNTARY WATER DEMAND REDUCTION--CONSERVATION.		85
1. Accelerate research and demonstration of crops that produce more per unit of water.	10	
2. Establish ET (Evapotrasporation) reporting stations.	1	
3. Accelerate research to determine the effect on crop yield ot water application timing and amounts.	5	
4. Expanded research and education programs to encourage irrigation scheduling.	2	
5. Accelerate research and education of water conserving irrigation system design.	5	
6. Establishment of low interest loan program for improved irrigation systems.	4	
7. Increase Cooperative Extension Services support in irrigation system and water application education (additional area irrigation specialist).	2	
8. Increase testing, monitoring and education programs for pumping plant efficiencies.	2	
9. Initiate large-scale research, demonstration, and education programs on alternative irrigated farming techniques (minimum till, low pressure, trickle), partial irrigation farming, and improved dryland farming techniques.	8	
10. Initiate programs that will increase farmer cooperation on testing new technologies in commercial farm conditions.	4	
11. Establish producer and agri-business funded research foundations.	4	
12. Establish producer information networks (price, education, new ideas, etc.).	2	
13. Establish programs to assist farmers wishing to switch from irrigation to rangeland.	4	
C. MANDATORY WATER SUPPLY RESTRICTIONS		4
1. Mandatory well spacing.	1	
2. Reduce allowable water withdrawals to less than 3 acre-feet per acre per year.	3	
3. Restrict crop water applications to a percentage of their full requirement.	1	
4. Require irrigation scheduling.	3	
D. INCREASE WATER SUPPLY (IMPORTATION AND MANAGEMENT)		7
1. Continue interstate feasibility studies with emphasis on quantity, sources, timing and cost.	3	
2. Study of feasibility of using alternative energy sources (wind, solar, etc.) to transport interstate and intrastate water.	1	
3. Study the feasibility of using playa lakes as a recharge water source or an irrigation water source.	1	
4. Expand the demonstration and education program to increase farm soil moisture availability from natural rainfall and snow.	5	
5. Expand the research effort into the utilization of saline water.	7	

Exhibit 2. Options for action and strategy priorities, responses from New Mexico Water Conference, 1982.