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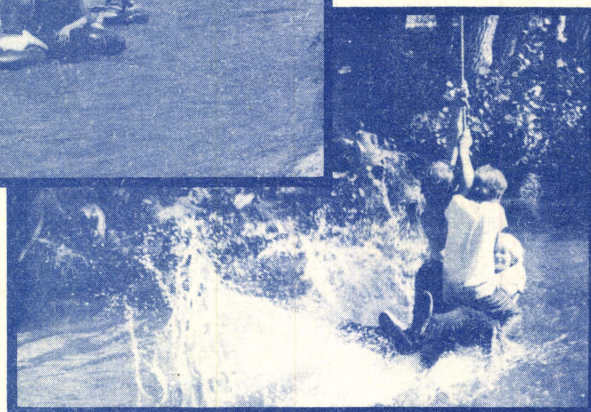
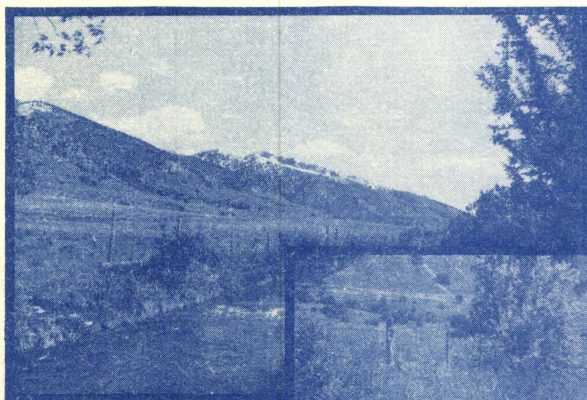
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MULTIPLE USES OF UTAH IRRIGATION CANALS: CACHE COUNTY AS A CASE STUDY

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Agriculture and Irrigation Engineering Department



PRJER024-1

**Utah Water Research Laboratory
Utah State University
Logan, Utah 84322**

December 1974

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and
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**Utah Water Research Laboratory
Utah State University
Logan, Utah 84322
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ABSTRACT

Irrigation use is an obvious benefit of Utah canals that has been recognized for over 100 years. This study attempts to illustrate other, less obvious, uses. The major use examined was recreational, but canals are presently functioning as storm drainage systems and have potential for diverting flood crests in many river systems.

Recreational use of canals falls into two categories. There is **passive use** such as its landscape values, affects on creating shade and bird-wildlife habitat, etc., that is difficult to quantify but no less important than **active canal use** such as tubing, hiking, bank-play, bicycling, etc. We selected several canals in and about Logan, Utah, and discovered considerable active use; this use will probably increase with suburban expansion. A Logan City canal that flowed year-round was also electro-shocked and found to have a resident brown trout population as great as many exceptional trout streams in the west.

The multiple uses of our case study can best be summarized as a contrast between community benefits and conflict. In return for the thousands of hours of public enjoyment that irrigation companies now provide, they get nothing but problems. We feel if communities don't begin to recognize the value of their canals and cooperate with canal companies to equitably share in the cost of public use, then canals of Utah will continue to be withdrawn from public use and become another amenity that is sacrificed to urbanization.

ACKNOWLEDGMENTS

Appreciation is expressed for the financial support provided by the allotment Program of the Office of Water Resources Research which made the study possible.

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CHAPTER 1

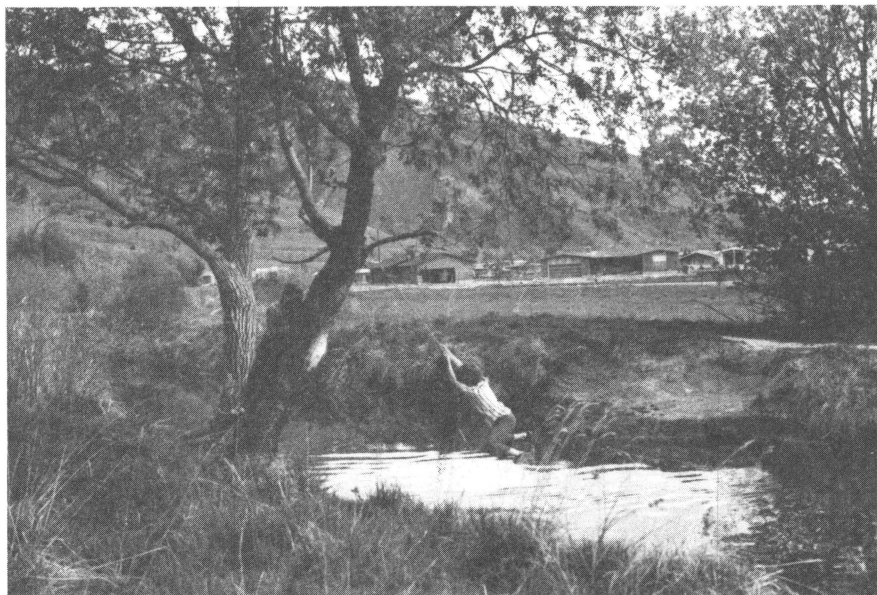
INTRODUCTION

Irrigation canals are an integral part of Utah's economy, landscape, and community character. They were one of the first group efforts of early communities, often before streets, schools, or religious developments were initiated. Many rural Utah communities still have canals and associated rows of poplars as part of their landscape and way of life.

Given the manpower and technology of the 19th century, constructing and maintaining canals was a Herculean effort. Motivation to complete canal systems was usually community survival and their design and management exhibited this single-minded purpose: get water to agriculture as quickly and efficiently as possible. Improvement in design and management of these canal systems up to the 1970's still exhibits this single-mindedness. Still by accident, rather than design, canal systems provide a multitude of community values other than the lifeblood of agriculture. They provide landscape values, catchable fish populations are often present, active recreation such as swimming and

tubing usually occurs, and they create a cool micro-environment for birds, wildlife, and children. Yet Utah canals and their pleasant environments are being devoured by urbanization. They are fenced, posted, encroached upon by building, and are being covered over; we feel this will be a loss to wildlife, the people, and one of the things that makes Utah special.

Irrigation canals of the state are generally owned by non-profit corporations and are managed by a president and board of directors. These managers get little or no payment for their labor, must resolve many stockholder problems and, in addition, contend with abuse from canal use by the general public. In return for thousands of enjoyable hours of public recreation their canals provide, recreational users pay nothing, communities cooperate little with canal managers, and debris-vandalism problems occur that further burden the job of managing a canal company. Understandably few canal companies enjoy providing these community services and many are discouraging or prohibiting public use.



This scene summarizes the dilemma of canal use: children enjoying a pleasant, cool environment with severe bank erosion as a result. A new subdivision grows in the background expanding recreational use.

This study was undertaken in the hope of generating interest in Utah's canals for public use and environmental benefits, and an advocate bias creeps in throughout this report. Without increased public awareness and more community-canal company cooperation, we feel that many Utah canals may be withdrawn from public use. In early stages of this project we hoped to carry our research to some actual engineering and architectural design. It became apparent, however, that many questions of ownership, legality, use, fish populations, etc., had not received previous study, and we were essentially starting at base data zero.

This report is then an overview or problem analysis designed to stimulate and awaken interest in multiple use of canal systems, rather than a detailed guide on how to convert canal design and management to accommodate these multiple uses. To stimulate public action, a report must be read by the public. We have, therefore, minimized technical jargon in our report, have used photographs as an integral part of our presentation, and have placed most technical matters and data in appendices. Hopefully the result is a report that county commissioners, newspaper folk, canal company officials, or a study group of the League of Women Voters will find readable and informative.



This canal environment, within the city of Logan, Utah, offers open space to hundreds of the homes and apartment units that immediately surround it.

CHAPTER 2

UTAH CANALS AS OPEN SPACE

"The small towns that bred the Presidents. . . are dying very fast. Like the compact Mormon towns I once knew in Utah, they are now bulging with layers of petticoats—real estate offices, secondhand car lots, lunch counters, billboards that merge into the petticoats of the next town." So remarked Alistair Cook (1974:4) recently. As an Englishman traveling through America, many Mormon towns once stood out as unique and

memorable. Today numerous Utah communities are being gobbled up by urbanization and digested out as just another bunch of ticky-tacky, impersonal, and commercial American-bergs. We feel planning, open space, marshes, streams, and canals have the potential to keep some Utah communities unique, compact, recognizable, and something pleasant for the memories of English travelers and Utah residents alike.



This shaded, stream-like canal environment is within one of Utah's largest cities.

Utah's population is one of the fastest growing and the eleventh most urban in the nation (Utah Outdoor Recreation Agency, 1974). Still the state has a proud and recent rural history; one that included less human concentrations with characteristic landscapes of open space, brick homes, and tree-lined canals. Salt Lake City is also the fourth fastest growing metropolitan area in the country, and such surging urbanization has swept aside many past landscapes and ways of life. We feel that canals and their environments are one such loss.

Many canal systems in urban areas have been fenced, covered, or otherwise removed from the community landscape and way of life.

This chapter examines criteria of community open space and how irrigation canals might qualify, with examples of canal utilization for recreational-open space by other western communities. We also review Utah's canal resources with special emphasis on the state's metropolitan counties.

Community Open Space: Definitions, Criteria, Needs

There are many philosophies of community planning that suggest goals, planning processes, system inputs, and desirable outcomes. There are similarities and strong differences between such philosophies, but a common point of agreement is the importance of open space in design, function, and image of a healthy community.

Open space can be broadly defined as all land and water in and around urban areas which is not covered with buildings (Tankel, 1963). Shomom (1971:12) defines open space relative to function as "... any space in urban America which promotes or has a tendency to enhance the natural environment: any area of land or water or air, whether reserved or unreserved, any green area, any view horizontal or vertical which improves the appearance of the natural scene or the natural environment, can be considered open space." He also distinguishes between open space "set aside" from urban development and open land that is "waiting to be developed." Common types of recognized open space set aside as such are parks, school yards, and nature preserves. However, there are many open space areas not designated or commonly recognized as such: gas and electrical right of ways, cemeteries, abandoned railroad tracks, municipal water system areas, and even sewage pumping stations or lagoons. Irrigation canals often fit this latter open space category.

It is difficult to state how much open space a community needs. Many planners don't even try. Chapin (1965:49) states a generally held view that "the problem is not how much but where can open space be found." One can obtain general standards on how many acres of open or recreational space is thought necessary per capita (U.S. Department of Interior, 1967), but these gross per capita acreage figures are often misleading. For example, New York City's Central Park produces impressive data of park acreage per 1000 people, but it is all in one chunk—located, like an oasis, several blocks away from most downtown New Yorkers.

In our study we feel a good community open space program should be evaluated on the following criteria:

1. **Adequate Area Per Capita**—most standards suggest 15-25 acres per 1000 population (U.S. Department of Interior, 1967);
2. **Easy and Equitable Access**—located within easy walking or cycling distance of residential area, with no large groups of citizens ignored; and
3. **Connected or Linked as a System**—with parks and open spaces connected by trails and paths. These areas should also be linked with heavily used portions of the community such as schools, downtown, or water fronts.

Obviously, each urban area is unique in its physical-social characteristics and type of "community character" it wants to present. A community with many young and elderly would need more space and greater accessibility than the average. Unique features such as mountains, swamps, or abandoned military areas might also concentrate and locate open space in other than an ideal distribution pattern.

Unfortunately, however, a common tendency of open space planning is to rush out and purchase big chunks of open land on the community perimeter. Such action often appears as a token sacrifice rather than a thoughtful attempt to integrate open space into the daily lives of a community. It also violates criteria 2 and 3 above.

Irrigation canals are sometimes overlooked in open space planning, yet they have great potential in satisfying criteria 2 and 3 in a good community open space system. Some community plans have recognized the potential of canals (Design Collaborative, 1971) and other western communities are achieving this potential with imaginative recreational use of their canal systems. To this latter group we now turn.

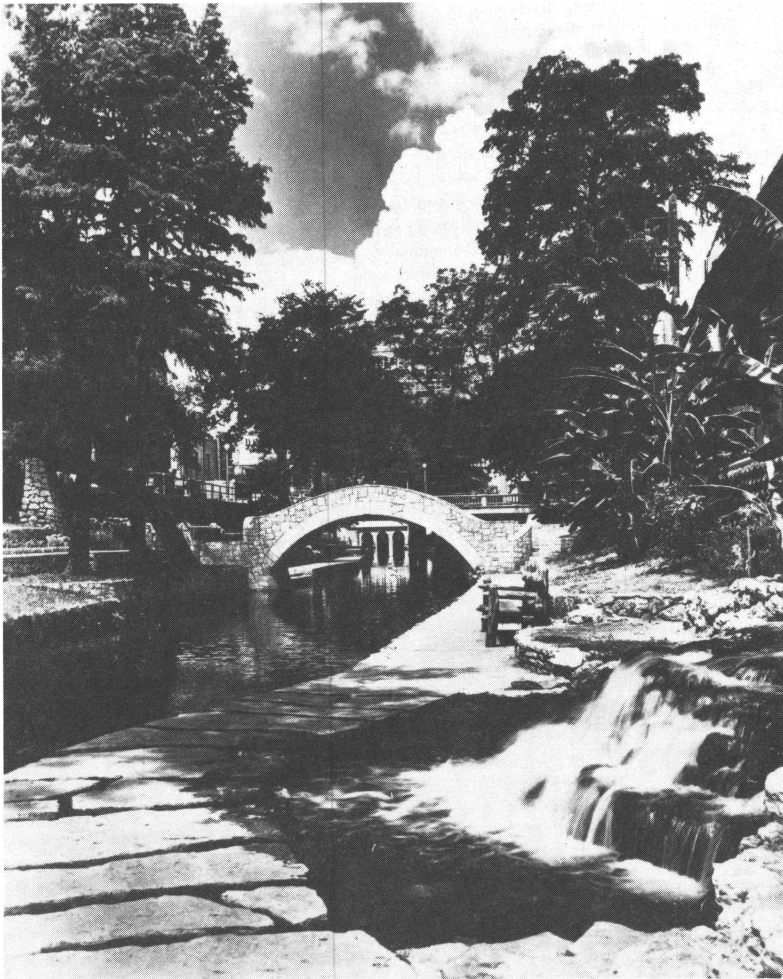
Western Irrigation Canals Presently Used for Recreation and Open Space

Although not a canal, one of the best examples of integrating a waterway into the life of a city can be found in San Antonio, Texas. The San Antonio River was once an ignored strip of water through that city. After creating considerable flood damage



This section of the San Antonio River was once destined to become a concrete lined, flood-proof ditch.





Sections of the San Antonio River carry no more water than many western irrigation canals as they flow through urban environments.

in 1921 a move was initiated to channelize the river and line its banks with concrete, but more innovative plans prevailed. Today this riverside environment is the core of one of America's most beautiful cities. Its banks are lined with attractively landscaped paths, restaurants, shops, and canal side parks. This waterway's story and an excellent discussion of its present assets is offered by Gunn, Reed, and Couch (1972).

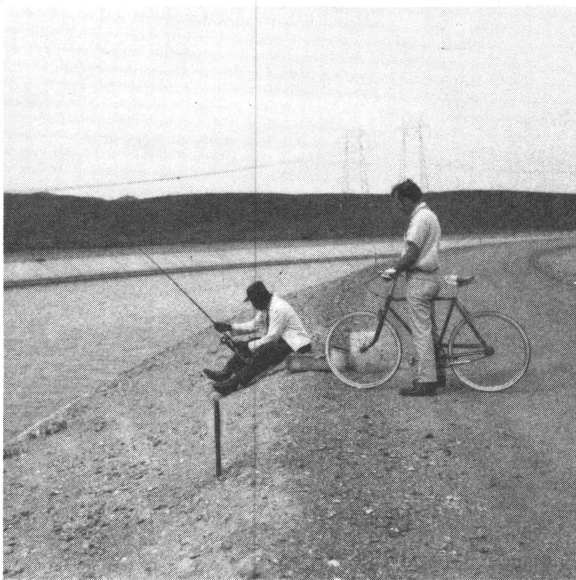
Another large waterway being utilized for activities other than its planned and designed irrigation function is the California Aqueduct. In 1972 a 67 mile bicycle and hiking trail was opened and it received such public response that much of the 450 mile aqueduct is scheduled for public fishing and trail access. This trail system will connect many state, county, and community parks planned along the perimeter (California Department of Water Resources, 1973).

A good example of recreational-open space use of irrigation canals more applicable to Utah

can be found in the Phoenix metropolitan area. In 1964 Maricopa County Park and Recreation Department entered into a 50 year agreement¹ with the Salt River Valley Water Users Association to permit horseback riding, hiking, and bicycling along the canal right of way (Gilbert, 1973). The result is known as the Sun Circle Trail that forms a 110 mile loop around Phoenix. The system required construction of several canal bridges, an interstate highway overpass, improved trails, and signing. Today it connects with many miles of National Forest trails plus many proposed and existing parks. This once single-purpose irrigation system is now the backbone of one of the best metropolitan recreation-open space programs in the west; and it all started with a few concerned citizens joining forces with an active recreational department and a cooperative canal company (Gilbert, 1966).

¹A copy of this agreement is presented in Appendix F.

Designed only for single-use irrigation purposes, the California aqueduct...



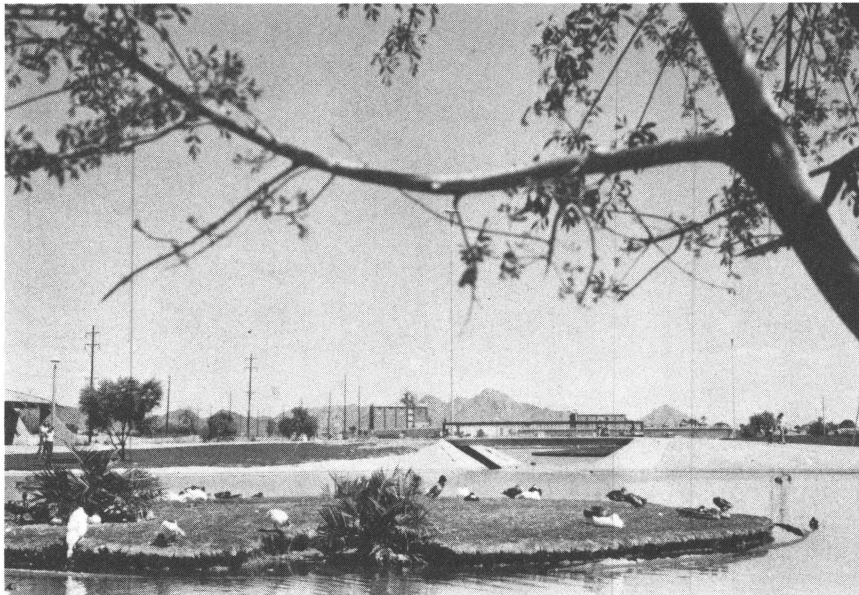
...is now being opened for fishing, bicycling and hiking use.

Another western canal system developing its recreational potential is the Highline Canal in Littleton and Aurora, Colorado. Accepted as part of the national trail system, this canal will provide about 100 miles of hiking, horseback, and bicycle trails through these suburban Denver communi-

ties. Yet of the many hundreds of miles of irrigation canals near Denver and other western urban areas, the examples presented here only represent a small portion of a great potential recreation-open space resource still to be recognized and developed.



A cooperative agreement between the cities of Littleton and Aurora, Colorado has set aside 100 miles of the Highline Canal for bicycling and hiking.



Nearby canal water is diverted to create this environment in Cortez Park, Phoenix, Arizona.

Utah's Canal Resources

In 1950 Utah reported 1,837 canal enterprises with 9,621 miles of canals and ditches (U.S. Bureau of Census, 1952). These enterprises are broken down into several categories as shown in Appendix A. Other detailed information on Utah irrigation canals is available there also; in this section we present only the larger canals in the more urban counties of the state.

The majority of Utah's population was urban in 1970. The metropolitan strip extending from Ogden to Provo (including the counties of Weber, Davis, Salt Lake and Utah) contains about 80 percent of the state's population. The two counties north of this metropolitan strip are also urbanizing rapidly. Box Elder County, with the Brigham City area, and Cache County, with Logan City, both had county populations about 60 percent urban in 1970. These six counties occupy about 13 percent of Utah's land area and contain about 85 percent of the state's population. It is in these counties that immediate and adequate open space planning is most urgent. We have, therefore, singled them out for special emphasis.

In 1950 there were 625 irrigation enterprises with 3,165 miles of canals and ditches² in these six urbanizing counties (U.S. Bureau of Census, 1952). Much of these canal lengths are undoubtedly in small ditches and feeder canals and have little recreation-open space potential. Consequently, we selected the larger canals of these counties (of approximately 100 cubic feet/second capacity or greater). As illustrated in Table 1 there is approximately 190 miles of large canal right-of-way in these urban areas, or 190 miles of potential trails and open space that already link many existing and proposed recreational areas, schools and communities.

Since our study was considered a pilot project, all urban counties of Utah could not be examined in detail. We concentrated, therefore, on Cache County—an area with a great canal resource and in rapid process of urbanization. To this case study we now turn.

²Ditches used to convey water from main canal to one or more farms are included. Ditches used to distribute and apply water on the farm not included.

Table 1. Some important irrigation canals in six counties of Box Elder, Cache, Davis, Salt Lake, Utah, and Weber.

No.	Canal	County	Capacity (cfs.)	Length (miles)
1	Logan-Hyde Park-Smithfield	Cache	100	9.1
2	Logan & Northern Canal	Cache	100	12.2
3	Ogden-Brigham Canal	Weber, Box Elder	120	24.2
4	High Line Canal	Utah	188	19.7
5	Salem Canal	Utah	> 100	8.0
6	South Canal	Utah	> 100	3.6
7	Murdock Canal	Utah	330	15.0
8	Weber-Provo Diversion Canal	Weber	253	9.0
9	Davis & Weber Canal above and below forebay	Davis & Weber	>100	22.7
10	Hooper Canal	Davis & Weber	161	14.6
11	Layton Canal	Weber	130	9.0
12	Ogden Valley Canal	Weber	80	9.3
13	Willard Canal	Weber	1,050	10.7
14	Provo Reservoir Canal	Weber	550	23.0
			Total:	190.1 miles

(Source: Water Commissioners' Reports and U.S. Geological Survey Maps).

CHAPTER 3

CACHE COUNTY — ITS CANALS AND THEIR USE

Daines (1967) recalls how in the early 1860's his grandfather was commissioned by Brigham Young to settle north of the Logan River. The settlement soon required irrigation water and they diverted the Logan River into what is now the Logan-North Field Canal. Four other major canals were constructed from the Logan River to support a growing agrarian population before the turn of the century.

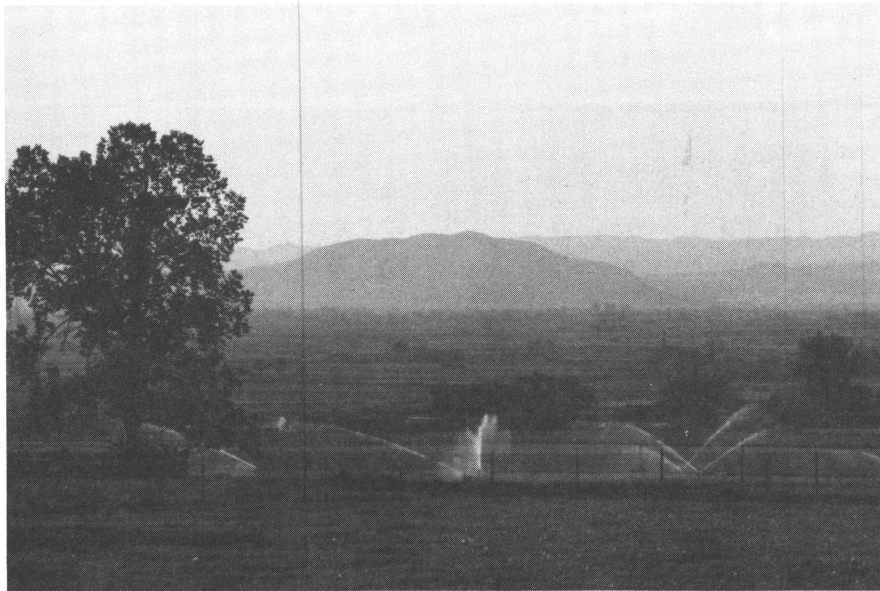
The economy and society of Cache County has changed in this century. In 1970 it had a population of over 42,000 of which 61 percent was urban; over 80 percent of the work force is now in non-agricultural employment (Bureau of Economic and Business Research, 1973). Logan is the only community in the county approaching city size, with a 1970 population over 22,000. The second largest community is Smithfield, with about 2,400 people. Other smaller communities and the

mountainous setting deceptively give the county and Cache Valley a rural, agricultural character. Part of this character is in the many miles of canal corridors that thread through Logan, the smaller communities, and rural areas of the county. But these canals and the county's rural character are threatened. Between 1950 and 1970, county populations have grown by 26 percent and urbanization has increased rapidly. Most urban development has also been unplanned—increasing the probability that maximum rural-environmental amenities will be sacrificed.

For its many miles of canals, their apparent heavy recreational use, plus the opportunity to save them as recreational-open space amenities, Cache County was selected as a case study. We focus even more directly on the Logan to Smithfield part of Cache Valley, where most of the county's people and canals are located.

Although used for recreation and creating pleasant environments, the major use of canals in rural Cache Valley is for irrigation.





One motive to combine three major canals into one high-elevation super-canal is to have an efficient gravity sprinkling system throughout Cache Valley.

Major Cache Valley Canals and Their Irrigation Use

There are four major irrigation canal systems in the Logan area of Cache Valley (Figure 1 and Table 2) and their capacity varies from 100 cubic

feet per second (cfs) to 40 cfs. Total gross area served by these canals is 16,736 acres (approximately 80 percent of which is under irrigation). The length, approximate dimensions, average annual diversion, areas served by each canal, and irrigation companies which operate and maintain these canals are given in Table 2.

Table 2. Major irrigation canals of Logan-area of Cache Valley.

No.	Canal	Capacity (cfs)	Length (miles)
1	Logan-Hyde Park-Smithfield	100	9.1
2	Logan-Northern Canal	90	12.2 ^a
3	Logan-Hyde Park Canal	40	7.0
	Logan-North Field Canal		2.3
4	Benson Canal	68	1.7
	Logan-Northwest Field Canal		4.0 ^b
5	Canal joining Logan-North Field Canal and Logan-Northwest Field Canal	—	1.0
		Total	37.3 miles

^aMeasured to about 2 miles north of Smithfield.

^bMeasured to about west end of Logan Airport.

(Sources: U.S. Geological Maps and Water Commissioner's Reports—Logan River Distribution Systems).

MAP OF
LOGAN CITY
AND SURROUNDING AREA

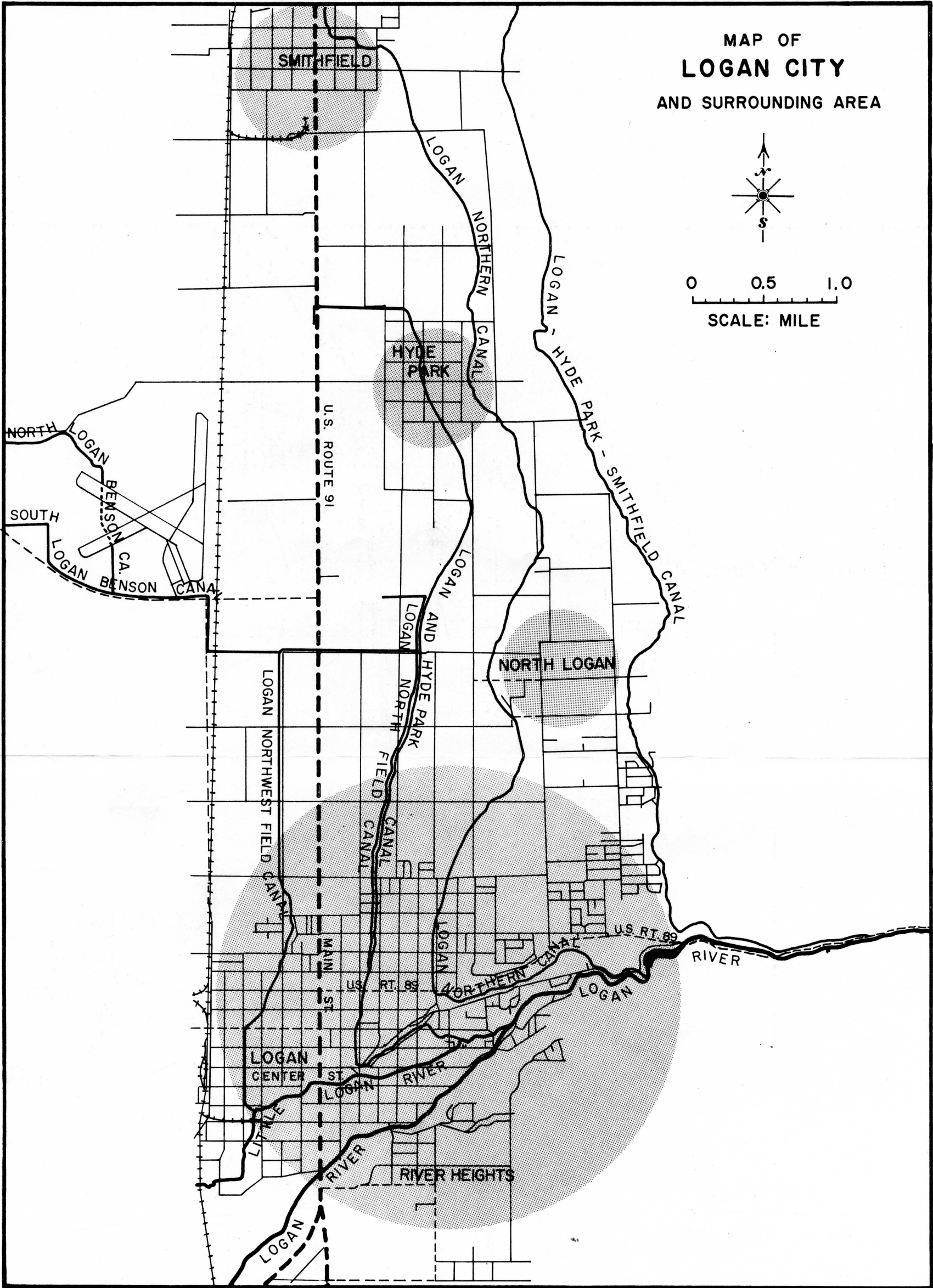
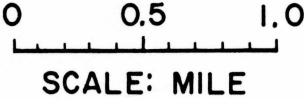
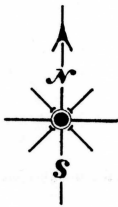


Figure 1. Major irrigation canals in Logan area.

Since most of these canals are about 100 years old, they appear in poor condition at places, but are functioning adequately. There is no excessive

leakage and most canal banks, though irregular, are stable. There is seepage loss however, as estimated by Down (1964):

Canals	Length Tested (Miles)	Seepage Loss (Percent)
1. Logan-Hyde Park-Smithfield	4.14	29.6
2. Logan-Northern	8.16	29.7
3. Logan-Hyde Park and North Field	3.84	10.9
4. Benson and Logan-Northwest Field	2.20	9.6

Canals higher on gravel benches show considerably more loss than the two in heavier soils of the valley floor. Records compiled by the local Soil

Conservation Service office for a 30-year period (1941 through 1970) indicate the adequacy of these canals (Table 3). Assuming water use efficiency

Table 3. A water use study for the canals in the Logan area. ^a

Canal	Total Area Irrigated		Irrigation Requirement (Acre-ft) ^b	Logan River Supplement		Excess (Acre-ft)	Deficit (Acre-ft)	Year	Year Deficit
	Served (Acres)	Area (Acres)		Water Right (Acre-ft)	Water Right (Acre-ft)				
1. Logan, Hyde Park & Smithfield	3600	2810	12,799	23,643	0	11,220	228	Average	7
			14,443	13,200	0	2,343	2823	1961	
			10,857	29,980	0	18,883	0	1950	
2. Logan Northern	3790	3340	11,636	23,933	3,568	15,847	0	Average	0
			12,040	14,010		5,541	0	1961	
			10,170	29,960		23,361	0	1950	
3. Logan North Field	1230	790	2,357	6,223	0	3,815	0	Average	0
			2,750	4,335		1,600	0	1961	
			1,967	7,515		5,480	0	1950	
4. Hyde Park	2210	2110	4,858	6,223	4,160	1,416	0	Average	0
			6,703	4,335		247	0	1961	
			4,797	7,515		2,483	0	1950	
5. Logan Northwest Field	2760	2510	5,463	8,688	3,002	3,126	0	Average	0
			6,540	6,060		833	0	1961	
			4,510	10,460		5,507	0	1950	
6. Benson Canal	2760	2650	6,719	4,166	554	506	938	Average	26
			8,610	3,020		0	2569	1961	
			5,590	5,230		897		1950	

^aTable prepared by the Soil Conservation Service, Logan, Utah, and presented at the Logan River Highline Canal Committee Meeting on February 21, 1973.

^bThe study was based on an assumption the water efficiency was 30 percent and using the base period from 1941-1970.

averages 30 percent and that 10 percent of moisture requirements are usually available from soil storage, no water deficits occurred for five canal companies. The Logan-Hyde Park-Smithfield Company had deficits of the water supply from Logan River of about 22 percent of the 30-year period; the Benson canal experienced deficits 87 percent of this period. This deficit only referred to the water supply from Logan River. Actually the area served by the Benson Canal may obtain a substantial amount of irrigation water from seepage from upper canals or other sources.

Although these canal systems appear adequate, plans begun a decade ago to combine the three larger canals into one high elevation, concrete-lined, super canal are still active. Such a system may be justified on irrigation efficiency obtained by reduced canal seepage and available head for widespread sprinkler use. However, several major socio-economic issues dealing with secondary water users plus recreational and amenity uses of present canals must be resolved before such a change would be feasible.

Storm drainage use of Cache Valley canals

Most Logan River canals pass through the Logan City limits. According to Ray Hugie, Logan City Engineer, approximately 70 percent of the Logan City's storm and surface drainage goes into these canals. At times excess city runoff is discharged on farms even though the lands are in

no need of extra water. So far no major problems have occurred between the city and irrigation companies. It is estimated the cost would be in excess of a million dollars to replace the use of canals with a complete city storm drainage system.

Use of irrigation canals for flood relief

According to the Corps of Engineers (1973), the Logan area has a long history of floods resulting from rapid high elevation snow melt in May and June. May 1907 was the worst flood recorded; its 2,450 cfs flow is considered a one in a hundred year occurrence. The largest flow in recent years was 1,680 cfs (recorded "above State Dam" gage) in June 1971 when general flooding of backyards of adjacent river homes occurred with some physical damage.

Since the Logan River flood period normally does not coincide with peak irrigation use, it may be possible to divert water from the river into the canals to reduce the flood damage in areas downstream from the canal intake structures. The amount to be diverted depends on the maximum capacity of canals which is equal to the design capacity plus permissible amount to be carried in the freeboard portion. The capacities of the Logan-Hyde Park-Smithfield and Logan Northern Canals are 124 cfs and 113 cfs respectively. Assuming the flow of 25 percent of the above capacities may be permitted in the freeboard portion, the combined capacity for the two canals is 296 cfs.



Canals can be an asset or an ugly and dangerous liability for neighborhoods...

...depending on season of year and adjacent development.



In order to understand the possibility, let us take the most recent flood of 1971 as an example. Figure 2 shows the hydrograph of the Logan River at the gaging station above the State Dam and the diversion into the Logan-Hyde Park-Smithfield and Logan Northern Canals. The figure indicates that at the time of peak flow in the Logan River the total diversion into the two canals was minimum at about 50 cfs. If the diversion were increased to the maximum of 296 cfs, the peak flow downstream from the diversion point of the Logan Northern Canal would be reduced to approximately 1362 cfs and no flood damage would have occurred.

It should be noted that in order to divert the flow into the canals at full capacities, portions of the canals may require enlargement and spillway. For this reason an intensive investigation to determine feasibility is necessary. The irrigation companies might also resist such a plan due to risk of possible canal damage and conflicts in operation from increased flows. If these problems could be overcome, the flood peak might be reduced as much as 200-300 cfs. Thus the flood of 1900 cfs which normally would cause serious damage could be reduced to the size of the June 1971 flood.

The method of channel improvement by removing silt and gravel from the channel to form low levees that increase the carrying capacity of the stream was used for the Logan River between Main and 6th West in 1971. Some people suggest that the channel improvement should be considered only as a last resort or as a supplement to other methods of

flood prevention. For this reason, a study should be made on the feasibility of using irrigation canals to relieve flood compared with the cost-benefits of other methods.

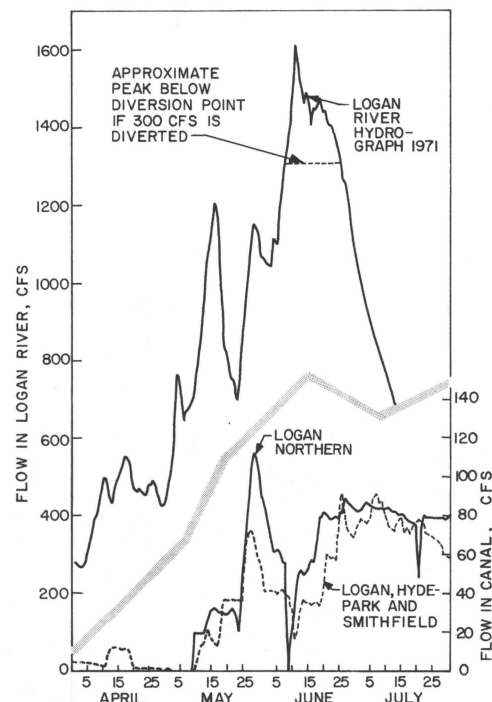


Figure 2. Hydrograph of Logan River [at above State Dam gage] and diversions in Logan - Hyde Park - Smithfield and Logan Northern Canals.

Management of Cache Valley Canals and Views on Recreational Problems

Most canal or irrigation companies are incorporated under Utah law on a non-profit basis and are financed by income from water users, most of whom hold stock (water shares) in the company. They are governed by a president and a board of directors. In most cases, the 4 to 6 directors are elected by stockholders to a 2 to 4 year term. One of their group is then selected as president. The president and board normally receive little or no monetary compensation. The presidents, especially, donate considerable time and effort to company management. In addition, a secretary is usually contracted to be responsible for billing and records; a water master is also hired to handle maintenance problems and control water dispersal. All water users of a specific system (say Logan River System) are monitored by a water commissioner that is paid by irrigation companies but responsible to the State Engineer. He must make periodic checks on river withdrawals for each company and submit an annual report to the State Engineer; see Daines(1966) as an example.

Stockholders and managers of canal companies are in agricultural occupations and primarily concerned with needs of their business and irrigation efficiency. We interviewed the decision-makers of two major irrigation companies in Cache Valley (i.e., the president, board of directors, secretary, and water masters) and not surprisingly, found them mostly concerned with

irrigation problems. Public recreation on their canals was viewed with mixed emotions. Some were openly hostile of the poor manners, lack of consideration, and zero financial contribution of recreational users, and would like to close canals to any public use. Most just wished recreationists and their problems would go away. But others recognized that recreational use and problems will not decrease, that prohibiting recreational use and enforcing such a decision would have many cost dimensions, and were willing to discuss possible cooperation with the city or county to manage public recreation on canals.

The major management problems caused by recreational use were of the nuisance variety such as throwing rocks in canals and playing with head-gates. The majority of company decision-makers considered these as minor but annoying problems, still most stated their company policy was to discourage recreational use. Many major problems in operating the company are not recreation caused but occur from adjacent landowners infringing on canal rights-of-way and utilizing the canal as a dump (primarily for yard debris).

Neither company had accident liability insurance, stating exorbitant cost as the major barrier. Although several board members dismiss liability risk as a serious threat ("recreationists are trespassers and are on canals at their own risk"), most were nervous about the threat of suit—some considered it the major recreational problem.

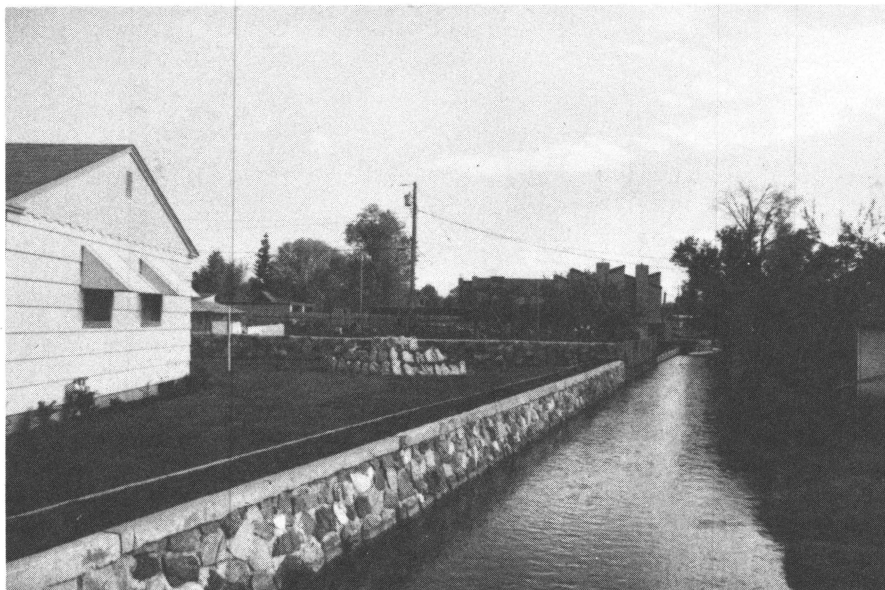


Rope swings provide many hours of summer fun for children but also create bank erosion and the fear of a possible liability suit.

We commissioned an environmental lawyer to examine this and other legal aspects of canals and his interpretation of canal liability prospects are given in Part 2 of Appendix B. Contrary to majority opinion of canal managers, Utah law might not consider recreational users as "trespassers" (the classification with minimal liability responsibilities by land owners). Since recreation is a long-standing and obvious use of canals, recognized by the community and canal company alike, users might be considered "licensees" or "invitees." The later classification has the most liability implications and usually requires the person's presence to benefit the land owner (i.e., a paying customer)

and probably wouldn't apply to current canal use. However, since most public use occurs with tacit consent of canal companies, users would probably be considered licensees. Land owners or operators have the responsibility under this condition to protect a licensee against any natural or artificial condition which is recognized as presenting unreasonable risk. Most canal officials cited danger-reducing behavior such as removing fences and cutting down rope swings as part of the water master's duty. Given such company action, their liability risks are low, especially since Utah law excuses canal companies from drowning liability for infants and children.

Many canal-side homes have encroached upon land belonging to canal companies...



...or the city of Logan, stopping access by the companies and the public.

Canal ownership

The seemingly minor problem of canal ownership occupied months of interviewing people familiar with canal problems and the search of many city-county records. Even then results were inconclusive. A legal examination of this problem is presented in Appendix B (Part 1). A summary of our current knowledge is presented here.

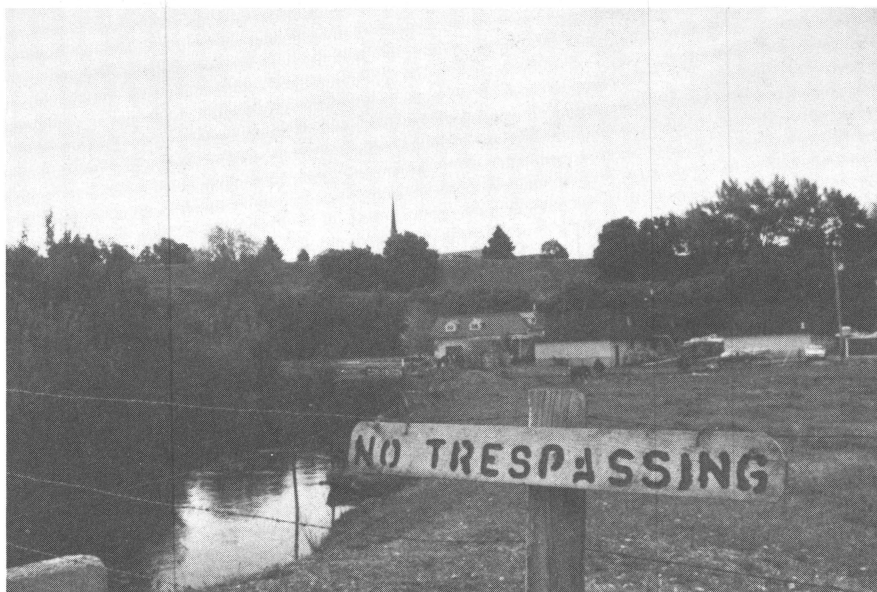
When most canal construction began a century ago, ditches were dug across public domain land. Their critical survival role was so obvious to state and local communities that no one questioned their legality or legitimacy. In such a social mood, few companies got around to seeking legal title—the water and time flowed on without problems.

Most canal company officials, water users, government officials and the general public assume irrigation companies own the canal bottom and right-of-way on one or both sides. Yet no company contacted had any recollection of legal documents and, since they are non-profit institutions, no tax records exist. After searching documents at the city and county recorder's office for several weeks, one document was located. Dated 26 March 1872 (Book B of Deeds, Volume II, Cache County Recorders Office, pp. 238-44), it turned ownership of most canals and their rights-of-way (like similar decrees for streets and parts of the Logan River) over to the City of Logan, Utah Territory. No similar document was located for canals in the county.

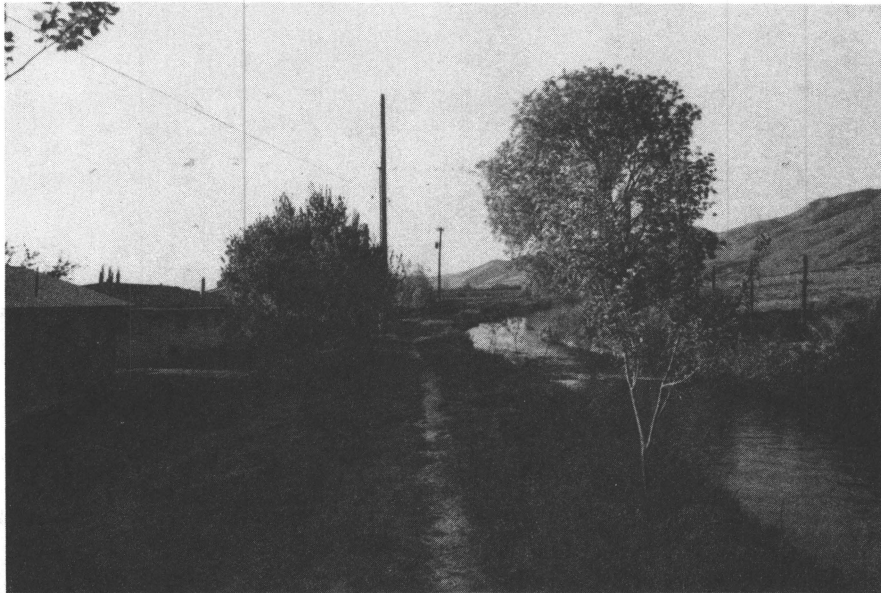
It is our opinion that canals and their rights-of-way covered in this document are still in city ownership even though many private homeowners have annexed their banks. The right of adverse possession by canal companies or private owners now using canal banks as their property is inoperable against a public agency like Logan City. Generally, if a person makes improvements, pays taxes, and uses a piece of land as his private property for seven or more years, title to that property reverts to him by "adverse possession." However, one cannot adverse possess against a public agency like a city.

Canals in the county and their used, unfenced rights-of-way have probably reverted to company ownership by adverse possession. Private land owners adjacent to canals can still adverse possess the right-of-way back by constructing fences, paying taxes, and restricting normal canal company use of the right-of-way for seven or more years.

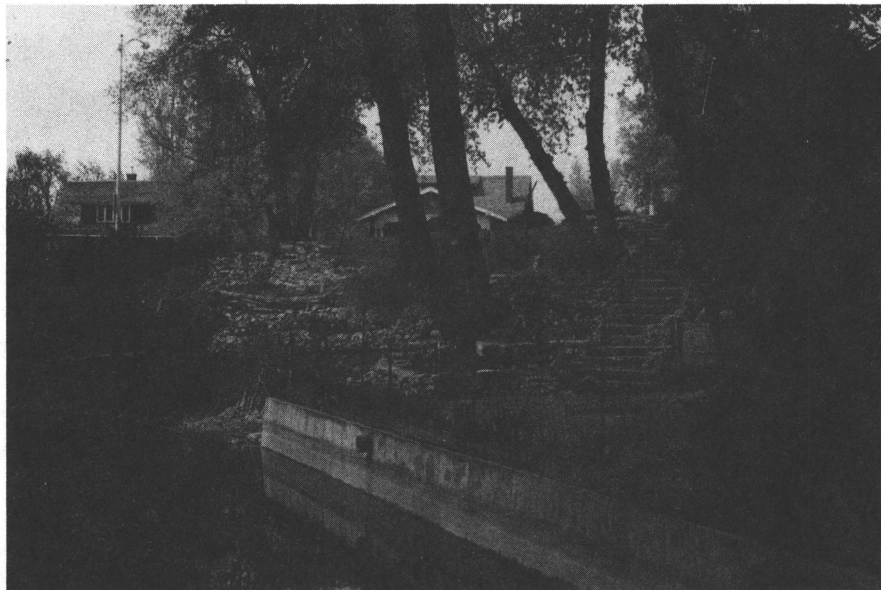
There are many complications and untested hypotheses regarding canal ownership in Logan City and Cache County that would have to be further searched and legally tested to settle this issue. See Appendix B (Part 1) for further information.



To the best of our knowledge, this private landowner is prohibiting public access to city land along the canal.



Some homes incorporate
the canal environment
into their landscaping
without blocking
public access...



... but most seal
off "their portion"
of the canal.

CHAPTER 4

RECREATIONAL AND OTHER MULTIPLE USES OF CACHE VALLEY CANALS

A summer visitor to Logan and Cache Valley may be impressed by many things, but one of the most memorable is abundance of water. Often after hours of driving in dry landscapes, they encounter Cache Valley communities with water rushing everywhere—through primary canals that appear as mountain brooks, in smaller feeder canals, and in street gutters, all rushing toward irrigation destinies, but cooling and refreshing the community on the way.

These canals are being managed for their designed and primary use: agriculture irrigation. The movement to combine three major canals of the valley into one high elevation, highly engineered super-canal may be justified on irrigation efficiency. Yet canals fulfill many community needs other than their intended irrigation role and these other uses often conflict with irrigation efficiency.

The multiple uses that irrigation canals of Logan City and Cache Valley accommodate are the subject of this Chapter. These uses will be grouped into the following categories:

1. **Passive use and environmental amenities**—the value of just having a cool pleasant canal nearby, with its effects on microclimate, vegetation and shade, bird and wildlife populations, etc.
2. **Adjacent landowner annexation of canal values**—where landowners on canal banks fence or otherwise restrict public use of canals, and monopolize a section for their own use.
3. **Active recreation**—such as tubing, play, bike riding, jogging, etc, in or along the canal rights-of-way.

4. **Fishing and fishery habitat**—the canal as a trout habitat, existing fish populations, and their angling use.
5. **Amenity values in public places**—the active and passive uses of canals in school yards, parks, golf courses, and other public areas.

Obviously there is overlap between categories (e.g., a person can enjoy active and passive values simultaneously in a walk or bike ride along canals, also different activities can occur together such as adults passively sitting along a canal while tubing, bank play and other active uses occur nearby).

Canal uses will merely be described in this chapter, without detailed examination of inherent problems and conflicts associated with their use. Multiple use conflicts and possible solutions are the subject of the closing chapter.

Passive Recreational and Environmental Use

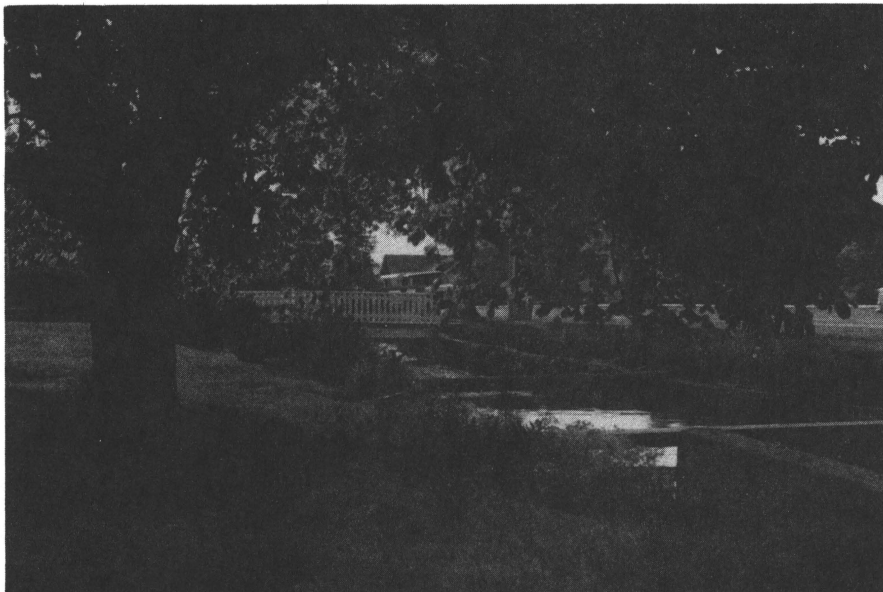
We suspect many canal values are achieved passively or indirectly. Such use is not evident as with active use like tubing or child's play. Passive values like the sound of running water as one walks to the store, children stopping on a bridge on the way from school, or the role canals play in defining neighborhood boundaries and setting the character of a community are all important, but difficult to define, articulate, and measure. As a consequence, most of these passive values were not measured in this study and may be understated without the glory of numbers such as hours of watching or listening to a canal and its bird life. We hope the perceptive reader will keep the importance of passive values in mind.

There are also many values that canals fulfill indirectly in providing seepage for bank vegetation and the vegetative-water effects on a neighborhood microclimate. Many shade trees could not survive in Utah's arid climate without canal seepage. Bird life is also noticeably more abundant along canals in all seasons. The many flocks of robins that endure Cache Valley winters feed heavily on caddis fly and other nymph life in half drained canals. The Logan-Hyde Park-Smithfield Canal is heavily used for this purpose. Its upper portion accumulates little ice, even in prolonged below-zero tempera-

tures, and during these cold spells flocks of robins can be observed wading the canal, feeding on the only available insect life in the valley.

Canal banks are often the only vegetative cover for wildlife during winter and spring in intensive agricultural areas. Consequently they are crucial pheasant habitat and nesting areas, comparable to fence row strips and other rare areas of permanent, thick vegetation that exist in heavily farmed landscapes (Baxter and Wolfe, 1973; Trautman, 1960; Linder, Lyon, and Agee, 1960).

The Logan-Hyde Park-Smithfield Canal forms the eastern boundary of Logan City and receives many hours of passive as well as active recreation.



This canal environment is adjacent to one of the heaviest-used foot and automobile routes in the city and is probably passively enjoyed by many people each day.

**Annexation of Canal Values
by Adjacent Landowners**

Confusion over ownership, lack of canal company resistance, and little neighborhood-city concern for public access has allowed many adjacent landowners to monopolize canal access

and values. The gradual fencing and gardening of canal banks has eliminated much canal access in Logan City. Many canal systems throughout the county are also blocked by fences, feeder lots, and no trespassing signs. Whether legal or otherwise, many adjacent landowners perceive canal rights-of-way through their land as their property.



Some homes have landscaped "their canal banks" and still allow public access...



... others completely block access and even hang out over the water.



The canal environment graces many Logan homes.



Many canals in rural lands are partially blocked by fences, feeder lots or barnyards.

Some adjacent homeowners incorporate canal landscape values into their yards without blocking public access. The general tendency, however, is to monopolize access and capture all canal values. Some homes have construction up to and even hanging over canal banks. Others expand their yard to include canal banks—some very elaborately landscaped with bridges and stone walls.

Such private restriction of canal access creates problems for both irrigation maintenance and public recreational use. Obstructions like fences might be removed rather easily. Encroachment by building foundations and expensive home landscaping would be more difficult to alter.

Recreational Use Survey of Logan Canals

Heavy recreational use of some canal sections is obvious during the summer; substantial use also occurs in the after school hours and weekends of spring and fall. This use is dispersed throughout rural canal sections, with increased use in the towns of Hyde Park and Smithfield. Greatest use concentrations, however, are in Logan City and suburbs.

A recreational use survey was initiated as soon as project funding was available (1 July 1972). Only the summer months were sampled and a June use estimate was made in 1973. Five canal sections were sampled and randomly sampled relative to day of month and time of day. Each section had public access and was used for recreation. These samples were distributed throughout the city on three different canal systems and they varied by amount and type of recreational use. Sampling design and detailed results of the survey can be found in Appendix C. An overview of findings is given below.

Amount and type of canal recreational use

At least 16,500 people use popular segments of Logan's canals for summer recreation for about 22,000 hours of total use. The popular tubing section of the Logan-Hyde Park-Smithfield Canal had about 265 people, floating for 420 hours, on one holiday (Pioneer Day: 24 July 1972). Recognize that use estimates presented here do not include less heavily used canal sections of Logan City and are only for the popular summer months. There are also many miles of canals in small communities and rural areas of the county that receive some recreational use—these were not sampled. Canals also receive fall, winter, and spring use—this is not estimated. Our sample, then, should be considered a **minimum estimate**¹ that **roughly illustrates** present recreational importance.

Canal recreational use varied by time of day, weekday-weekend-holiday, and by month. Table 4 presents recreational use by month, illustrating the greatest activity in July and August. Total hours of use was distributed with 49 percent of users hours occurring on weekdays, 47 percent on weekends, and 4 percent on the two holidays (Independence and Pioneer Days). As illustrated in Figure 3, recreational use is low in summer mornings and increases after lunch—peaking about 4:00 p.m. After a sharp decline for dinner, use peaks again about 7:30 p.m.

¹Another reason for considering this a minimum use estimate was the abnormally cold, wet weather during the June 1973 sample. Rain and snow flurries occurred several days. It snowed during a June afternoon of one 2-hour sampling period as an interviewer waited on the Logan-Hyde Park-Smithfield Canal for tubers who never showed.

Table 4. Summer recreational use on select segments of Logan-area canals.

Type of Activity	June 1973		July 1972		August 1972		Total	
	Number	Hrs Use	Number	Hrs Use	Number	Hrs Use	Number	Hrs Use
Tubing	1,186	1,282	5,952	8,302	5,304	7,395	12,442	16,979
Play	374	369	412	462	1,518	1,436	2,304	2,267
Walking	145	162	241	441	238	473	624	1,076
Bicycling	267	300	193	309	206	318	666	927
Fishing	32	32	145	137	61	61	238	230
Misc. ^a	44	52	127	149	208	220	379	421
Total	2,048	2,197	7,070	9,800	7,535	9,903	16,653	21,900

^aMiscellaneous activities included sitting, reading with feet in water, jogging, etc.

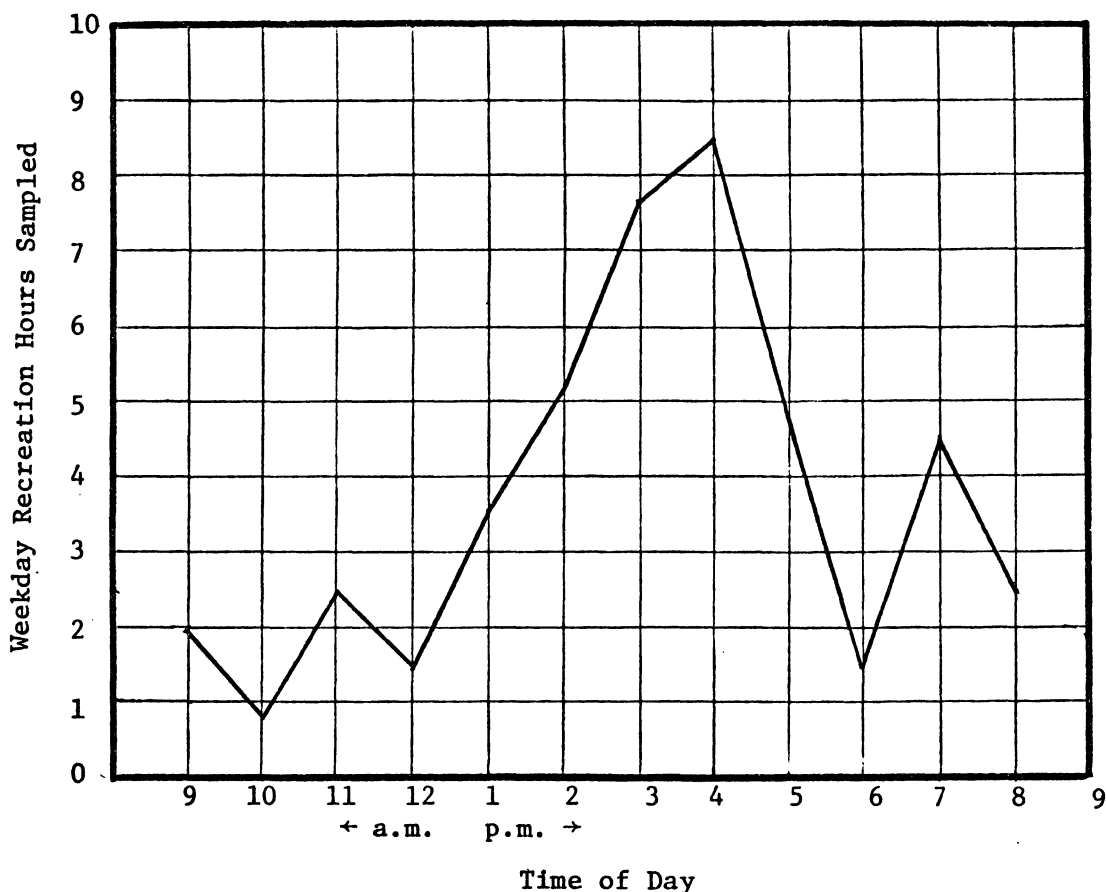


Figure 3. Distribution of weekday canal use by time of day.

Many types of recreational activities occur in or along canals, but tubing accounts for the majority of hours in our sample. Of total recreational time measured, distribution was:

Percent of Summer Canal Recreational Hours

Tubing	78
Play ^a	10
Walking	5
Bicycling	4
Fishing	1
Misc. ^b	2
Total.....	100

^a Play includes activities in canal or on its banks such as rope swinging, tree house activities, wading, etc.

^b Miscellaneous activities included sitting, reading with feet in water, jogging, etc.

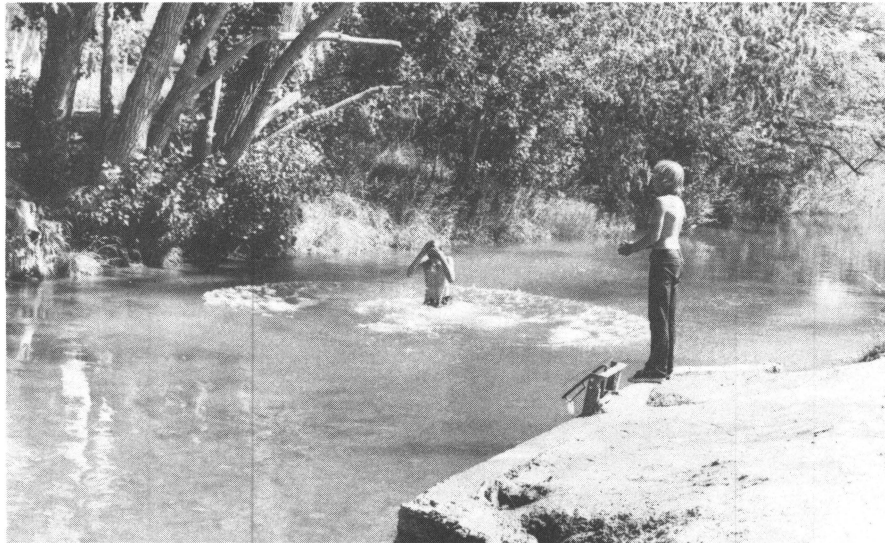
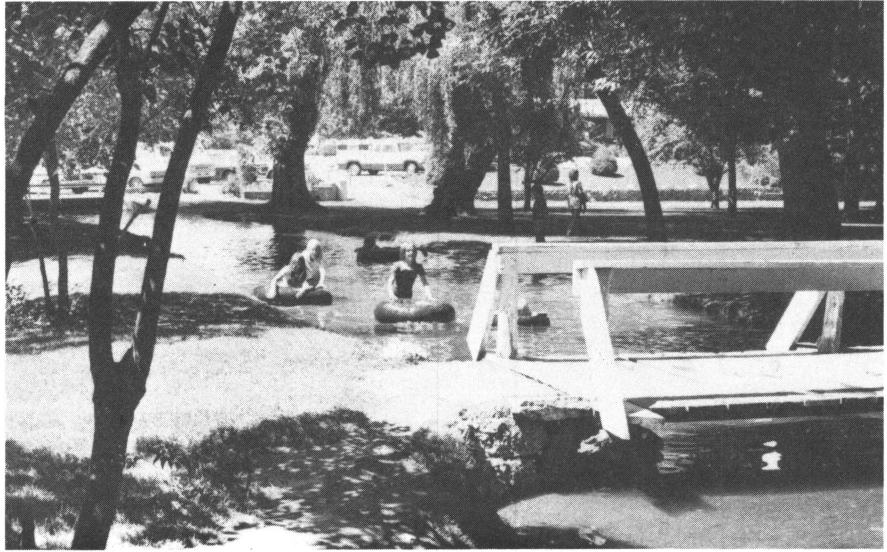
Floating the canals on car or truck inner tubes is a regional activity and very popular in Cache Valley. From the source of the Logan-Hyde Park-Smithfield Canal there is a fast, scenic ride of about 2 miles to the Logan Golf and Country Club and course and an optional mile or two continuing, at a leisurely pace, along the east boundary of Logan City. This canal segment had most of the tubing—accounting for about 85 percent of all tubing and about 65 percent of all recreational use sampled.

Unlike child dominated canal bank activity, tubing is a family or group activity as illustrated by the average (mean) age of users:

Tubing	20 years
Play	11
Walking	21
Bicycling	15
Fishing	11

Most recreational uses are neighborhood activities with an average distance of two blocks between

Canals are for kids...



...who use them for leisure...

...and recreation.



users homes and the canal. Tubers of the upper Logan-Hyde Park-Smithfield Canal, however, come from all over the city and region. The majority of tubers live within the city and county, but others come considerable distances: a church group from Ogden was sampled, a national scientific conferences at Utah State University adjourned early to enjoy this indigenous activity, we also met two Catholic nuns from Salt Lake City bouncing down the canal, and counted folks from several foreign countries. We also sensed that tubing this canal served as an initiation rite for many new residents, college students, or visitors to Cache Valley.

Aside from walking, other canal activities are dominated by children. Although they generally stayed less time than tubers and generated fewer use hours in our study, children are the most visible users along most canal sections. Rope swings are often a special attraction and play centers on these sites. Along any canal, wherever there is access and suitable habitat (i.e., shade and vegetative cover), children or signs of their activity can be found. As discussed later, some of this "sign" such as litter, bank deterioration, stick-stone dams, and tree shanties are damaging to recreational and irrigation use.

These data indicate the importance of canal recreation to numerous people. Perhaps it would have been prudent to sample user attitudes as we

tallied their use. Due to the number of child users, we did not seriously consider this option. Interviewing children is not in vogue with our scientific peer group—besides, what can a kid tell you, plus they don't vote or pay taxes. Yet we recall peeking into a secluded niche in a wild plum thicket along the canal and asking two girls what they liked about this place. One of the 8-year-old interviewees responded that "It was their special place . . . like Christopher Robin's "Hundred Acre Woods" (Re: **Winnie the Pooh**), it was a nice place to be at." Seeing her father walk the dog along the canal in mornings and evenings—we speculate he feels the same way.

Two Canal Neighborhoods

Logan's canals come close to the lives of many residents. In some sections of the city they are an active part of neighborhood life. Some neighborhoods use their canals more passively. Due to the nature of the canal, its access, or age of residents, most canal use is landscape, visual or leisurely bank use—little or no bicycling, tree climbing, tubing, or wading can be observed. In many neighborhoods canal banks have been annexed by adjacent landowners and are recognized as private property. But even in such neighborhoods where public access is largely restricted, portions of canals near bridges or vacant lots receive considerable active and passive use by the public.



Canals are one of the few remaining areas in a city where bands of young pirates can build hide-outs.

In an effort to contrast differing canal environments and user groups, a survey was taken of two neighborhoods: one **actively** using the canal, another with largely **passive-environmental** uses. Details of survey methods, questionnaire content, and results can be found in Appendix D.

Active use neighborhood

Golf Course subdivision is the official platted name of this neighborhood. Located in the northeast corner of Logan and developed in mid-1960, it is like several city subdivisions and an **indicator** of canal use that can be expected from numerous similar developments planned for the city fringe. The neighborhood is generally upper middle class, the average (mean) age of adults is 39 years and most families have young children (mean number of children per household is 2.4, with a median age of 9.8 years). About 15 percent of the neighborhood is older, childless couples of 60+ years of age.

The Logan-Hyde Park-Smithfield Canal forms the east boundary of the neighborhood and Logan City. This locates the canal at distances from backyard to two blocks from all residents. Although visible from only a few homes, the canal has heavy active and passive use. The canal has a well used path along its bank, its stream is natural in appearance, and the average flow and depth (about 75 cfs and 1 1/2—2 1/2 ft, respectively) does not present much danger for children of grade school age. It is also one of the few canals to maintain a token winter flow. Even during colder months there is bank play, cross-country skiing, and snow mobiling along its banks.

We randomly selected 19 of the 80 families in the neighborhood for interviews (about a 25 percent sample). All families were very cooperative, interested in the canal, and appreciated the importance of the study. Heads of households were given a questionnaire examining canal assets and liabilities. All family members were asked to recall their use of the canal for an average month in summer 1973; younger children were given assistance by their parents in estimating their canal use. We realize the intensity and methods of sampling merely provide a rough estimate of canal use. A more careful diary method, emphasizing randomly selected weeks, would probably be a better neighborhood use estimate. The attitude sample is, however, a much more accurate description of the neighborhood.

There were 37 adults and 35 children in our sample for 72 potential canal users. Of this group, 48 reported their canal use for summer 1973. Of

the 24 not reporting, 8 were over 60 years old and didn't use the canal, 2 children were too young, 7 adults returned active use estimates for their children but none for themselves, and 7 failed to return any use charts. Considering the 48 people reporting, Table 5 shows a great amount of use for the summer of 1973, with walking, playing, tubing, and bicycling most popular. The 1,846 occasions⁴ is an average of about 13 trips to the canal per month, which is not unusual with the heavy child use. For the entire neighborhood this use would expand to about 7,800 occasions totaling over 7,500 hours of use.

There were 37 heads of households in the active use neighborhood responding to questions on canal assets and liabilities. In all, most adults thought the canal a great neighborhood asset. The few disadvantages of safety risk, "weedy" banks, or noise of canal users had a minimal effect on their overall rating—as response to this multiple-choice question indicates: "Thinking of all the advantages and disadvantages of the canal, is it:

	Respondents
an asset to your neighborhood;	23
neutral in its effect on your neighborhood;	12
a liability to your neighborhood	1
Total replies. . . .	36

When asked to list "the good things" respondents liked about the canal, the following five were most commonly offered:

	Number Responding
recreational activities like tubing, jogging, cycling . . .	21
pretty, nice, or aesthetic setting- environment	11
close to nature; natural environment	10
place for children to explore, play	8
place to stroll, walk, relax	5

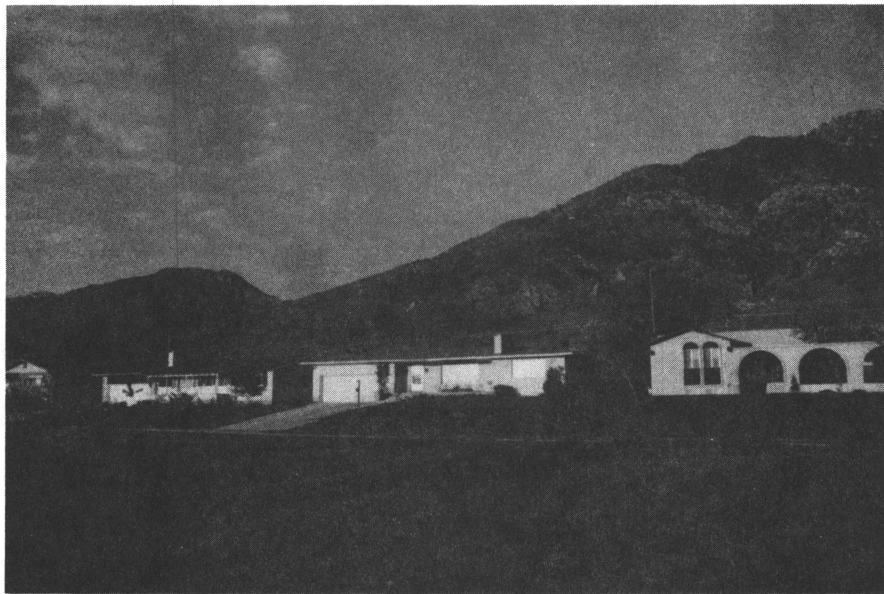
A similar question seeking "bad things" about the canal had the following responses:

	Number Responding
no bad things	15
safety hazard	13
noise and bother of canal users	5
some people throw trash there	3
some weedy and trashy banks	3

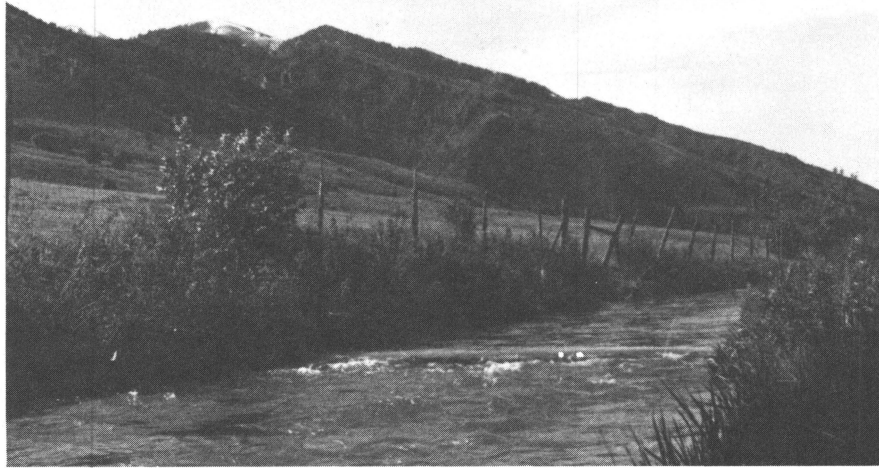
⁴An occasion is any trip to the canal. Many children in this neighborhood make two trips (occasions) to the canal on an average summer day.



The active use neighborhood is in the Northern corner of Logan...



...consisting of young, upper-middle class families...



...and has a pleasant, stream-like canal on its eastern border...



...with an open path along the right-of-way...



...and has a touch of beauty in all seasons.

Table 5. Summer 1973 recreational use of Logan-Hyde Park-Smithfield Canal by nineteen families in active use neighborhood.

Activities	Number of Occasions				Total occasions	User Hours				Total user hrs
	21 yrs	Age Groups				21 yrs	Age Groups			
		21-17	16-13	12-4			21-17	16-13	12-4	
Tubing	46	5	52	137	240	63	11	92	225	391
Playing	104	8	46	387	545	87	7	66	330	490
Bicycling	73	2	24	192	291	47	1	14	140	202
Fishing	0	2	0	6	8	0	8	0	3	11
Walking	319	28	85	181	613	281	28	68	160	537
Dog Training	45	0	40	0	85	30	0	40	0	70
Picnic	1	0	0	2	3	2	0	0	4	6
Rope Swing	0	1	0	0	1	0	1	0	0	1
BB Gun Hunting	0	0	0	45	45	0	0	0	77	77
Wading	0	0	0	15	15	0	0	0	4	4
Total occasions by groups	588	46	247	965	1,846	510	56	280	943	1,789

The good things listed are topped by active recreational uses, but note the passive appreciation expressed. The canal is apparently not just a place to actively recreate, but a pretty, natural and soothing place to recreate and relax. Most people saw little or nothing bad about the canal. Several of those who mentioned safety hazards commented that hazards were no more than playing in the street or an adjacent gravel quarry.

Passive use neighborhood

Contrasting the natural stream setting of the active use canal, upper middle class status of the active neighborhood and its suburban setting—the passive use sample is in an older section of Logan with a domestic—front yard canal setting. Although public sidewalk access exists along much of the bank, one sees little active canal use. The

water is too deep for wading, there are few shade trees, many bridges inhibit tubing, and few children live along the canal. The canal above and below the sample area is closed to public access due to annexation by adjacent homeowners, thus the right-of-way is not used as a major inter-neighborhood travel route as with other canal sections.

We designated the passive use neighborhood as homes both sides of the Logan Northwest Field Canal as it flows four blocks along 4th West street from 2nd South to 2nd North streets. There were 45 homes in this strip of which we sampled 15, getting 13 usable returns (29 percent sample). Heads of households were elderly (70 percent being 60 years or older). Most had lived there many years (mean length of time 31 years) and were amused or baffled that anyone would care about the canal. The three households sampled with children were more interested in the survey and appreciative of its value. But even these families only rarely participated in active canal recreation and their children were forbidden to use it alone. Although valued for its enhancement of the front yard and street environment, there was almost no active use.

Eight male and 10 female heads of household were represented in this attitude sample. When asked "good things" about the canal, the following items are listed:

Number
Responding

pretty, nice or aesthetic appearance	10
good for irrigation	8
like to watch the ducks ⁵	6
fun or nice for children	2

There were also many "bad things" listed, and some anger expressed when mentioning them:

Number
Responding

garbage and trash dumped in canal	7
no bad things	6
untrimmed bank with weeds, etc.	4
unsafe for children	3
danger of flooding	2
hazard in driving cars across bridges	2

Unlike the canal previously examined, this one has a mud bottom, flows slowly and has a trashy appearance when drained. The canal company also empties the system from October to May, fearing ice blockage and flooding. Several previous

⁵A flock of about 8 domestic ducks are visible and pampered neighborhood pets.



The passive use neighborhood has a canal as part of the front yard...



...with lower middle class homes separated from the street...



...and although a pleasant environment much of the year...



...is drained and unsightly during the winter months.

attempts to maintain a token winter flow to protect the canal bottom has resulted in ice and snow damming the system.

Still, with all its liabilities, the majority (11 respondents or 61 percent) thought the canal "an asset" to their neighborhood, 4 (22 percent) felt it "a liability" and 3 (17 percent) considered it "neutral" in effects.

Fishing and Fishery Resource of Canals

Most Cache Valley canals have water quality and temperatures adequate to maintain native trout and whitefish populations. Some are much better habitat than others due to bottom condition, depth, and vegetation on banks or bottom. The major problems in developing canals into a trout fishery are prolonged winter drainage, periodic chemical treatment for aquatic vegetation, and lack of community-state agency perception of their potential.

During the first summer of this study only one canal (Island-area section of the North Field Canal) was required to maintain a full stream of water throughout the year; this was due to a water-power agreement with Central Milling Company. We electro-shocked three sections of this canal in August 1972 and found a resident brown trout population as good or better than nearby Logan or Blacksmith Fork Rivers—both rivers considered

top quality trout streams in the state and nation (Bridges, 1963). This canal was drained in October 1972, however, when the flour mill converted from water to electrical power. It was the first prolonged drainage the canal experienced in several years.

The Utah Division of Wildlife Resources salvaged several tanker trucks of brown trout from the drained canal. Yet most trout hid, seeking pools under bridges and trees. The majority of these fish survived until spring when warming conditions increased plant decay and water temperatures, killing the entire population. In spring 1973 the sight and odor of decaying trout was obvious along the canal; a rough estimate would have about 2,600 trout weighing over 1,000 pounds laying throughout the North Field Canal System from its source to the Cache County Fairgrounds.

Fishing use

Fishing only occurred on the North Field Canal and accounted for about 30 percent (178 hours) of weekday summer activity on that canal section; no fishing was observed on weekends. The average age of fishermen was 11 years and most lived within four blocks of the canals. Many children did not exhibit great skill in pursuing fish, which is a special disadvantage in catching brown trout. Yet several large fish were taken and determined effort was eventually rewarded with a trout or two.



Slow moving portion (section 1) of the Little Logan River Canal had over 2,000 brown trout (6 inches or greater) per mile.

Given the known trout populations of island-area canals, we expected greater angling activity. Our low use estimate may be partially explained by the sampling period. Many adults and children

who regularly fish this canal go early in the morning or late in the evening when bank activity is low and brown trout are active. Our sampling times would have missed these people.



Heavily drained in winter 1972, section 1 held most of its trout population until warm temperatures of spring.



A faster current and more bank vegetation than section 1, section 3 also had over 2,000 brown trout per mile.

Trout population before and after drainage of North Field Canal

This is a summary of results from electroshocking fish in three parts of the island-section of the North Field Canal; statistical details, methods and other information is found in Appendix E. The three sections were selected to display varying habitat:

- Section 1. A slow moving (1-2 cfs) and deep channel (3 1/2-4 ft) stream with abundant water cress vegetation on mud bottom; there was sparse bank vegetation.
- Section 2. Moderate current (2-2 1/2 cfs) and 2-2 1/2 ft depth, with rocky bottom and sparse bank and bottom vegetation.
- Section 3. Relatively fast current (3-4 cfs) with depths of 1 1/2-2 1/2 ft Rocky bottom and abundant over-hanging bank vegetation.

Each section was shocked in August 1972 and 1973. Fish were temporarily paralyzed by shockers, netted, identified, counted and weighed. All were capable of swimming away when released.

Brown trout dominated the fish population, with only 1 whitefish and 2 rainbow trout captured. During August 1972, before the canal was drained, we estimated from 1,000 to over 2,000 brown trout per mile of canal depending upon water flow, depth, stream bottom, and bank vegetation. As Table 6 indicates, sections 1 and 3 had more than twice as many fish as section 2. This was probably related to the depth and aquatic vegetation of section 1 and the bank cover of section 3 as compared to the sparse aquatic and bank vegetation of section 2. Notice the mean length of trout in all sections was about 10 inches. Several trout were captured over 14 inches; one was 18 inches and over 2 pounds.

Table 6 also illustrates the dramatic decline in numbers and size of brown trout after the canal was drained. Several trout had migrated into the canal between May and August 1973, but trout were 80-90 percent less numerous than August 1972 and were less in length and weight. We do not know how many years would be required to achieve the 1972 brown trout population (once assumed a stable resident population). The question is academic, however, for this canal will probably lay drained each winter.

Canal Amenities Through Public Places

Canals flow through and connect most public places in Cache Valley. They go through the two major high schools, becoming an integral part of

Table 6. Brown trout populations in three sections of the North Field Canal, Logan, Utah.

	Before Drainage August 1972	After Drainage August 1973
Section 1		
Number brown trout (>6")	279	21
Mean Weight (lbs)	.49	.36
Mean length (in)	10.70	8.00
Section 2		
Number brown trout (>6")	126	30
Mean weight (lbs)	.44	.23
Mean length (in)	9.80	9.80
Section 3		
Number brown trout (>6")	297	24
Mean weight (lbs)	.39	.30
Mean Length (in)	9.80	7.40

Logan High School's environment. Canals are an important part of Central and Willow Parks in Logan City plus they flow through Cache County Fairgrounds. They also go through or near other proposed or existing parks in the city and county. Of the 19 community parks suggested in Logan city's open space master plan (Design Collaborative, 1972), 12 had canals in or bordering them.

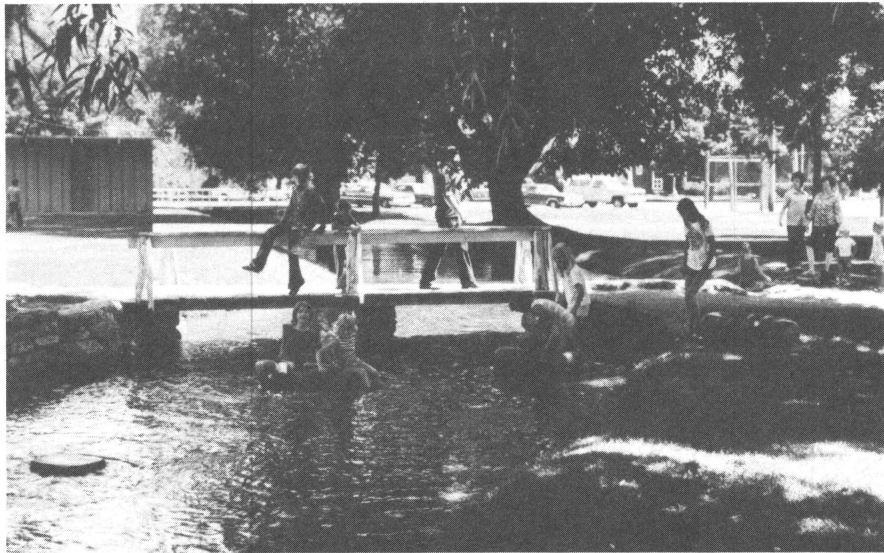
Canal systems also connect Logan City with National Forest land, tie into public utility land in Cutler Reservoir, link up with the airport, and bond the valley communities of Logan, North Logan, Hyde Park, Benson, Smithfield, and others with a network of potential recreational corridors.

The potential of these canals to further enhance public places and link them into a network of scenic and functional trails is enormous if perceived and acted upon by communities. To this and other problems and potentials of future canal use in Cache Valley we now turn.



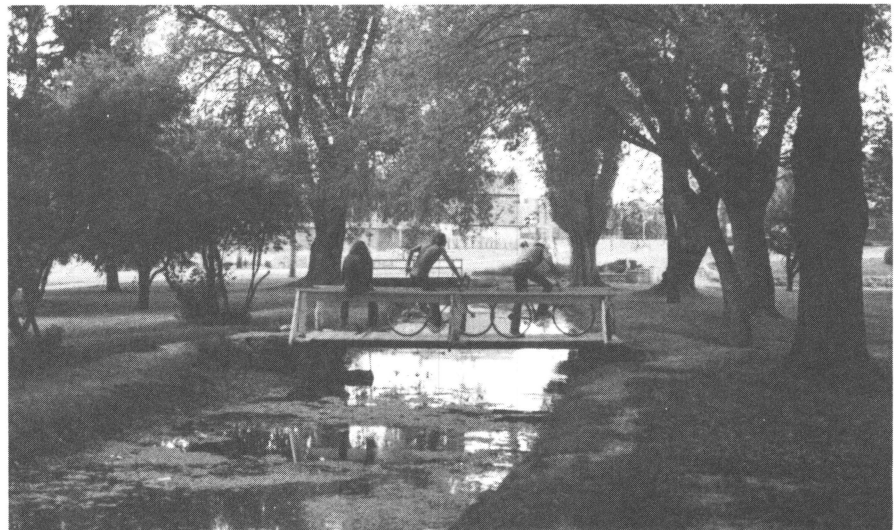
This canal complements...

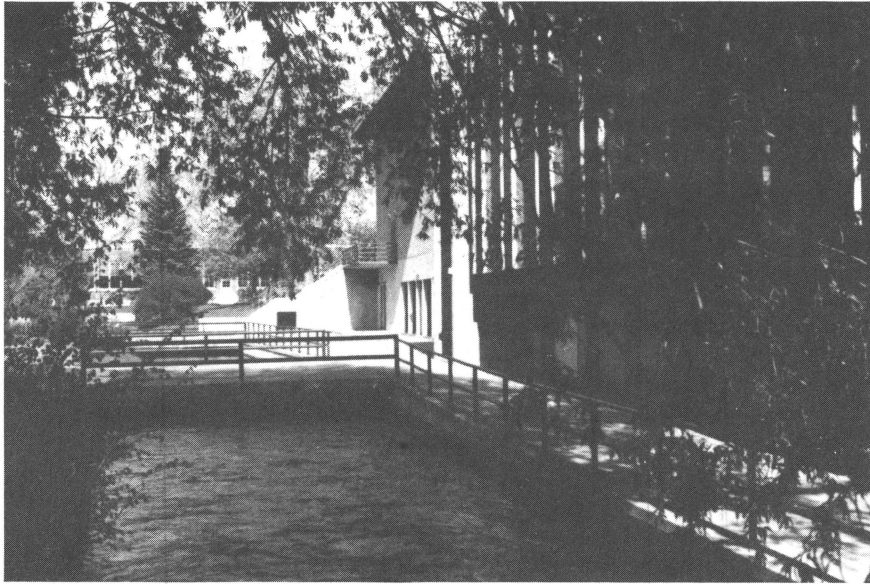
...Logan's Central Park...



...in any season...

...and attracts active
and passive users.





This canal is an integral part of Logan High School's setting and a popular area for groups to congregate.

CHAPTER 5

FUTURE RECREATIONAL USE OF CACHE VALLEY CANALS: PROBLEMS AND POTENTIALS

The multiple use of Cache Valley canals can best be summarized as a contrast between community enjoyment-benefits and conflict; both benefits and conflicts are increasing. If these opposing forces continue uncontrolled, we suspect an impasse on many canal systems—resulting in a battle of which recreation, open space, and community good will are the probable casualties.

Irrigation benefits are an obvious value of canals that have been recognized for over a hundred years. We have tried to illustrate some other important, but less obvious, canal benefits. The active recreational use measured on a few segments of Logan City canals alone accents these community values. On some summer weekends,

the recreational use of certain city canal sections is equal or greater than the use of some city parks or nearby National Forest campgrounds. In return for these hours of enjoyment, however, canal recreationists give irrigation companies nothing but problems.

We expect recreational use of canals, and resulting conflict, to increase in the future. In the "active use neighborhood" surveyed, the average family contributed about 100 hours of canal recreational use during the summer of 1973, for a neighborhood total of about 7,500 hours. This canal is functioning as a free neighborhood park. One wonders how long this "park" will be open in the future, for there are about 5 similar



When developed, the Foothills Subdivision in the distance will probably double recreational use and associated conflicts on this section of the Logan-Hyde Park- Smithfield Canal.

subdivisions planned or under development just along this canal segment. We suspect the recreational use of this section of the Logan-Hyde Park-Smithfield Canal will expand by about 50 percent when these subdivisions are completed. The resulting conflicts between canalside residents, other recreationists and the irrigation company are ominous, and might be ignored by the city and county until impassable.

In this chapter we intend to define some of these conflicts and suggest some means of resolving them. Several constraints that might frustrate conflict resolution are also examined. But before getting involved with conflict resolution, some "snapshots" or a glimpse of some canal futures are presented.

A Glimpse of Some Canal Futures in Cache Valley

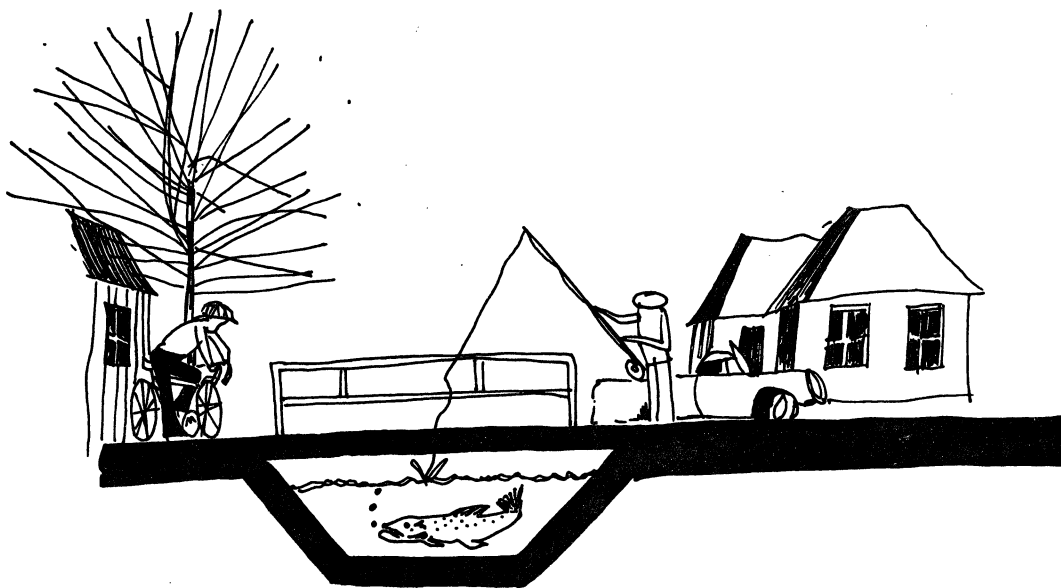
We are not overly concerned with practical problems of accomplishing the "snapshots" presented in this section; later sections of the chapter are reserved for this purpose. We feel that all snapshots presented here are realistic and feasible. The major ingredients in converting them to reality will be: foresight and planning on the part of community recreation agencies, good will and a spirit of cooperation between communities and canal companies, and fair and equitable rewards made to canal companies so the irrigation function of their canal is insured and liability-management costs of canal recreation is absorbed by the community.

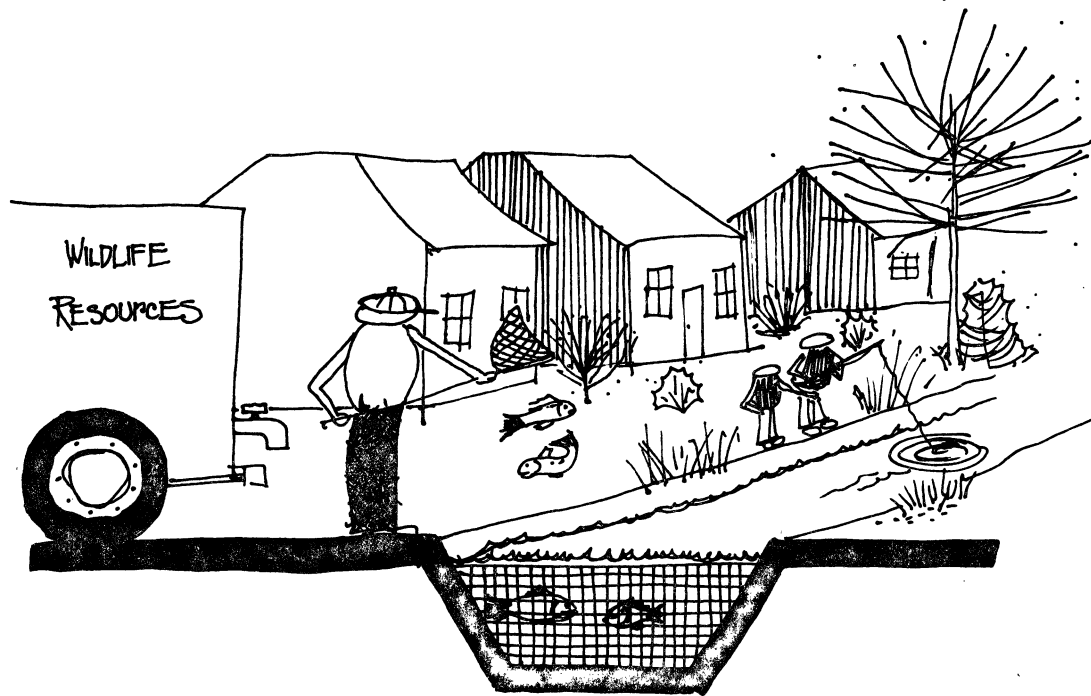
The possible canal futures examined here are specific to Cache Valley, but have state application in almost all cases. The suggestion that canal trails be developed to link Logan with surrounding public land, for example, is applicable to most Utah urban areas on the Wasatch Front—for most have National Forest to their east and the Great Salt Lake to the west.

Establishing resident brown trout and other fish populations in canals

Few cities in the world have the opportunity to boast of a resident brown trout population within their corporate limits. Given half the chance, exceptional brown trout populations could be established in several Logan City canals. Even draining canals for emergency or maintenance work would not destroy these populations if done in cool weather, a token flow maintained, and if drainage did not persist over 2 to 4 weeks. When Logan's "island-area" canals were drained in October 1972, most brown trout found sanctuary for several weeks in pools and under bridges. With just minimal consideration, several miles of Logan canals could maintain from 800 to 2,500 brown trout per mile.

We have singled out brown trout since they have demonstrated their ability to thrive in some canals. Not all canals or canal sections would be suitable brown trout habitat. As some canals continue through Logan and into the county, their water quality declines (Meyers, Middlebrooks, and





Porcella, 1972) and warmer water fish like bass or panfish might be more appropriate. Also the chemical control of aquatic vegetation annually practiced in county sections of canals would kill fish life and some canals also do not have the gradient to keep an ice-free winter flow without maintenance. But several canals have demonstrated their ability to carry reduced winter flows adequate to maintain fish populations.

The advantages of this resident fishery would be easy access, the uniqueness value for a city, the self-sustaining nature of brown trout populations, and the great habitat productivity of several canal sections. As with most canal developments, the children would benefit most from the proximity of these trout. As compared to deep Logan River reservoirs that are popular with children, these canals would be much safer for young, unattended fishermen and do not require parental taxi service. The major constraints to this program are canal company attitudes, lack of interest in canals by Utah Division of Wildlife Resources, and the trail-bank stabilization necessary to provide access and maintain irrigation efficiency.

Canal sections stocked with trout for children

In canals where resident trout populations are not feasible due to prolonged winter drainage or other factors, sections could be partitioned with fishproof grates and stocked for children. Surviving trout could be recovered during fall drainage and returned to the hatchery.

Children have few recreational activities they can do by themselves in a relatively safe, cool environment like pursuing trout on a July afternoon. Parents and adults are usually around parks, schools, and family camping trips to instruct, direct and control a child's activity. It would be refreshing to have a place that a child could walk to in 10 to 15 minutes and just fish when the mood was right and this could be accomplished without pestering Dad or Mom to drive up the canyon.

Many canal sections in Logan and on the suburban fringe have water conditions and access to serve as a stocked trout fishery. Fishproof grates

would have to be installed and public money allocated to keep them free of debris. Foot bridges and bank stabilization might be necessary. Community pressure might also be required to persuade Utah's Division of Wildlife Resources of the wisdom of such a program. In addition, canal company interest would have to be protected.

Linking Logan to public land and open space on the city perimeter

Logan has numerous open space assets on the city perimeter. National Forest land lies a mile or less outside its eastern limits. First Dam on the Logan River is now in city ownership, Cutler Marsh to the west is under public utility easement, and many acres of farm land surround the city. But each year Logan expands outward, streets become more congested and unsafe for a child and bike, canal rights-of-way are blocked, and the city and its people become more and more isolated from the open space on its perimeter.

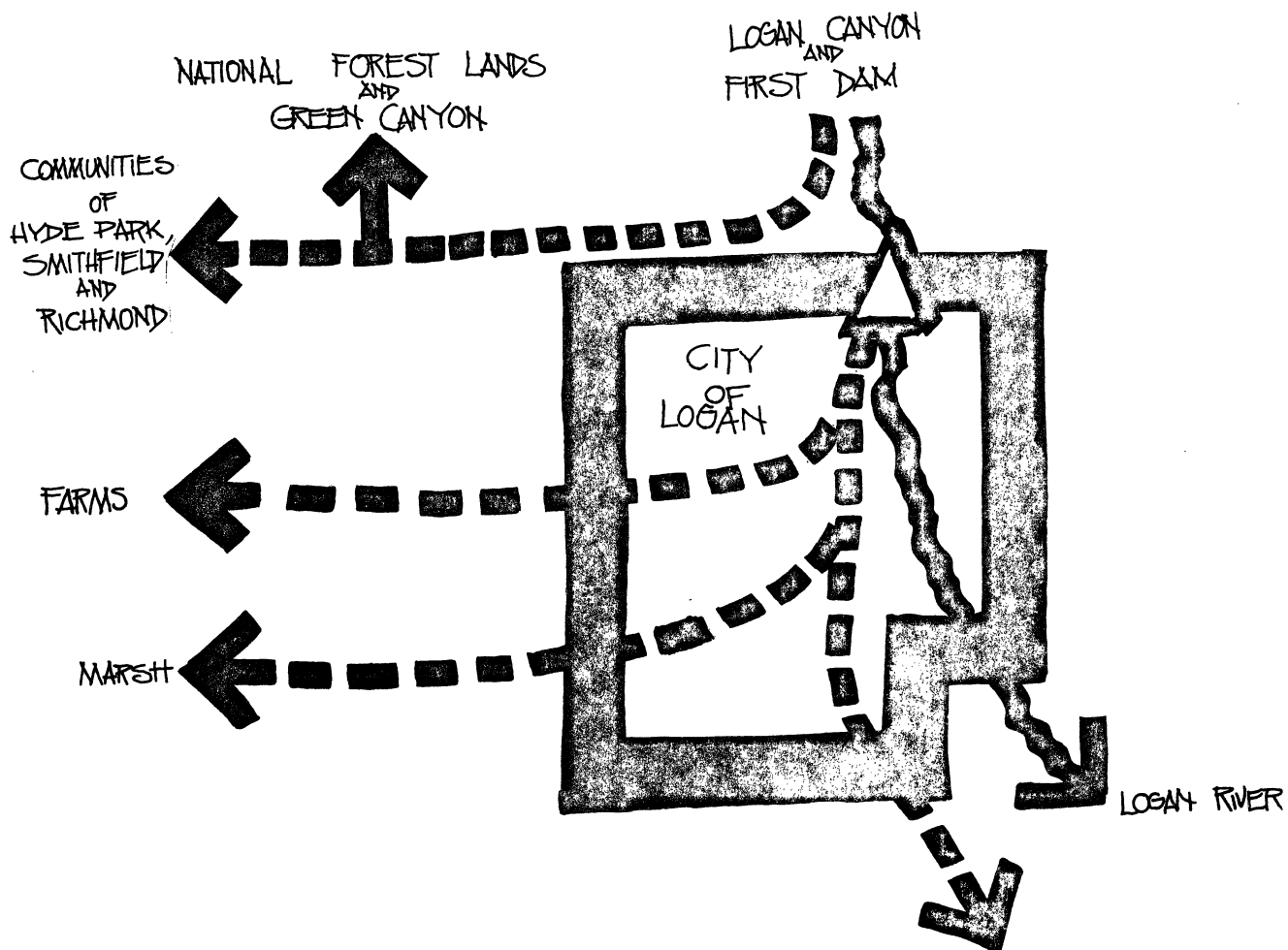
Several canal systems illustrated above could serve as trail corridors linking the city with open

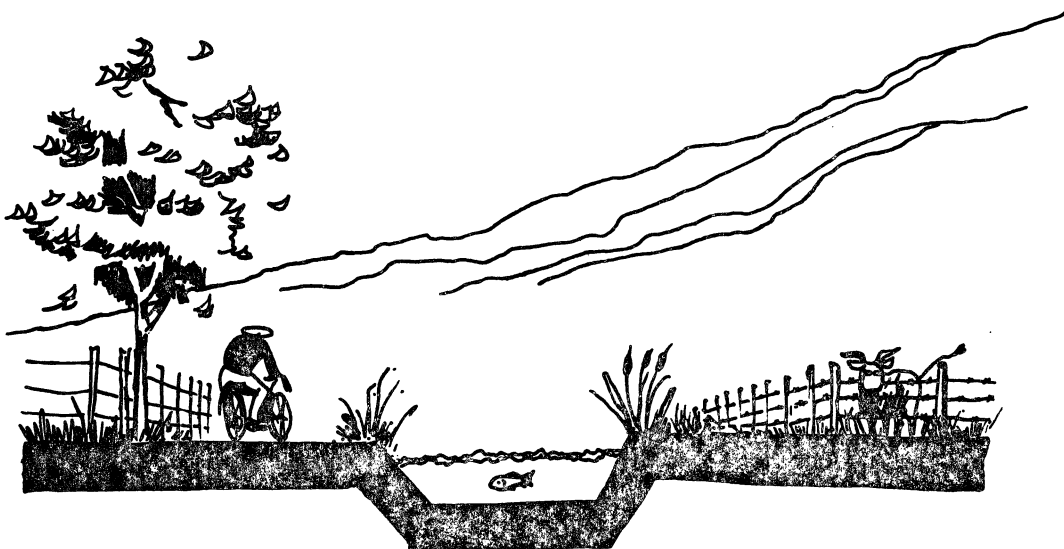
space assets on its fringe. The upper part of the Logan-Hyde Park-Smithfield Canal could link with Green Canyon and National Forest land; and Benson Canal might be trail access to the marsh and the Logan Northern tie into farm land. Canals and the Logan River might combine to link the city with open space to the west. There are also old railroad lines and sewage rights-of-way that could join with canals to provide this linkage.

In a time when Logan faces a high expansion rate and energy-mobility problems loom in the future, planning for such trail systems would be timely.

Linking Cache Valley communities with a canal trail system

As Cache Valley communities expand outward with streets becoming main highways and secondary roads becoming unsafe for a man with a horse or a bike or his child, the need for an inter-county trail system greatly increases. Many canal corridors link Logan City and other communities.





They are the safest and most pleasant trail setting in the valley.

Several canals have open rights-of-way along much of their length. The Logan Northern Canal has a completely open bank from Logan to Smithfield—a distance of 7 miles. Obstructions on other canal banks range from barbed wire fences to major barriers like barnyards and feeder lots. Efforts to obtain canal company consent for such a trail system might be difficult and expensive in certain sections, but there are some mutual company-public benefits.

Irrigation canals and their environment are one thing that makes Cache Valley unique. Public-canal company cooperation to make them into a trail system would have joint benefits, especially if the public proved its goodwill by adequate assurance and protective construction along the trails. Such cooperation will not be simple or inexpensive, but the benefits might be worth the effort—with these trails possibly becoming the backbone of a county park system. But the time to start is now, before increased recreational conflicts reduce the receptivity of canal companies.

A canal-side mini-park system

Many canals are already used as park corridors, but urban development is continually closing access. Logan City has a little used sub-

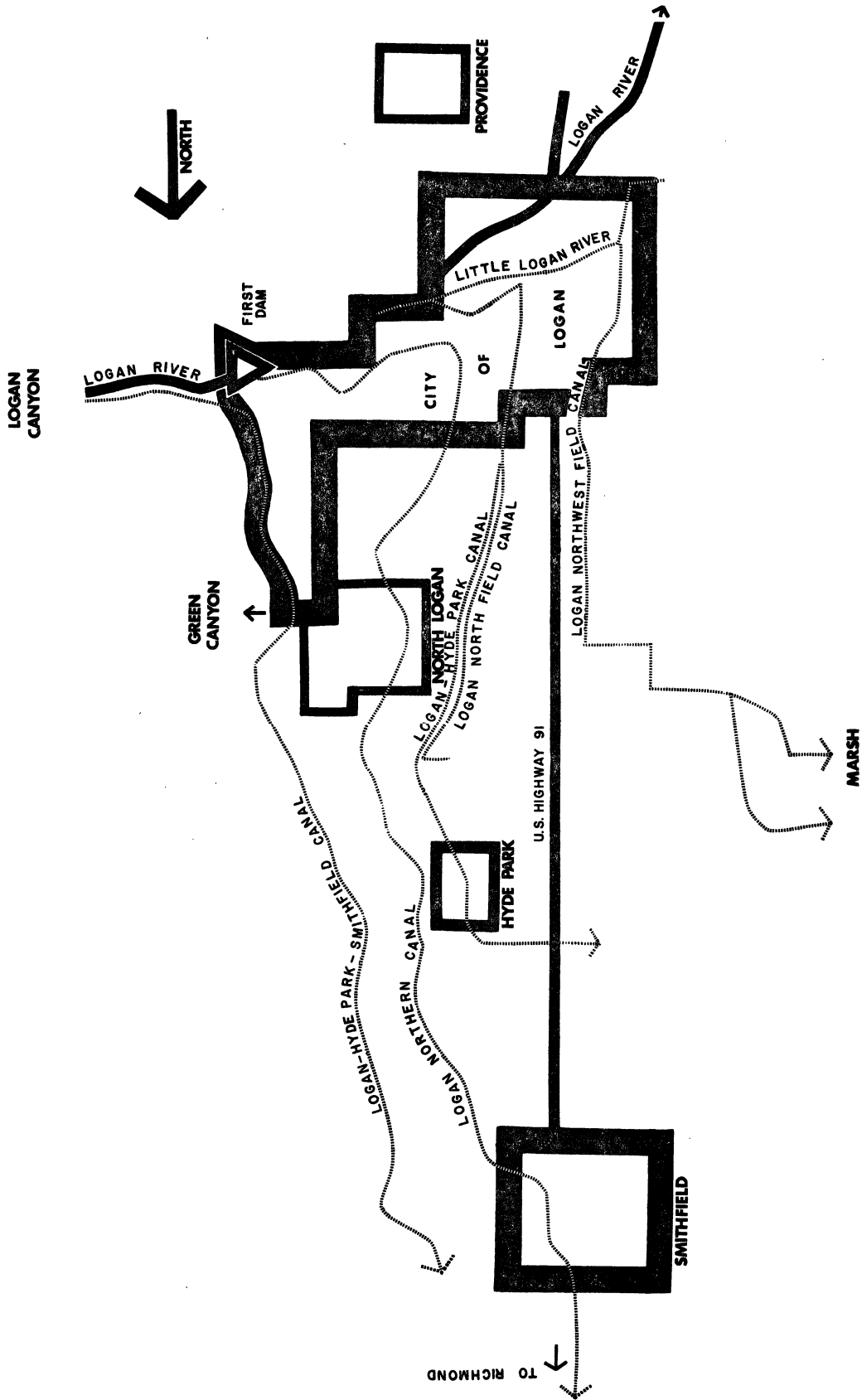
division ordinance that requires developers to turn over 10 percent or less of their area to public recreational space. Subdivisions on canals, at least, could have 10 percent of their space reserved for public access and neighborhood mini-parks. These canals could serve an important linkage function in such a park system (see Design Collaborative, 1972).

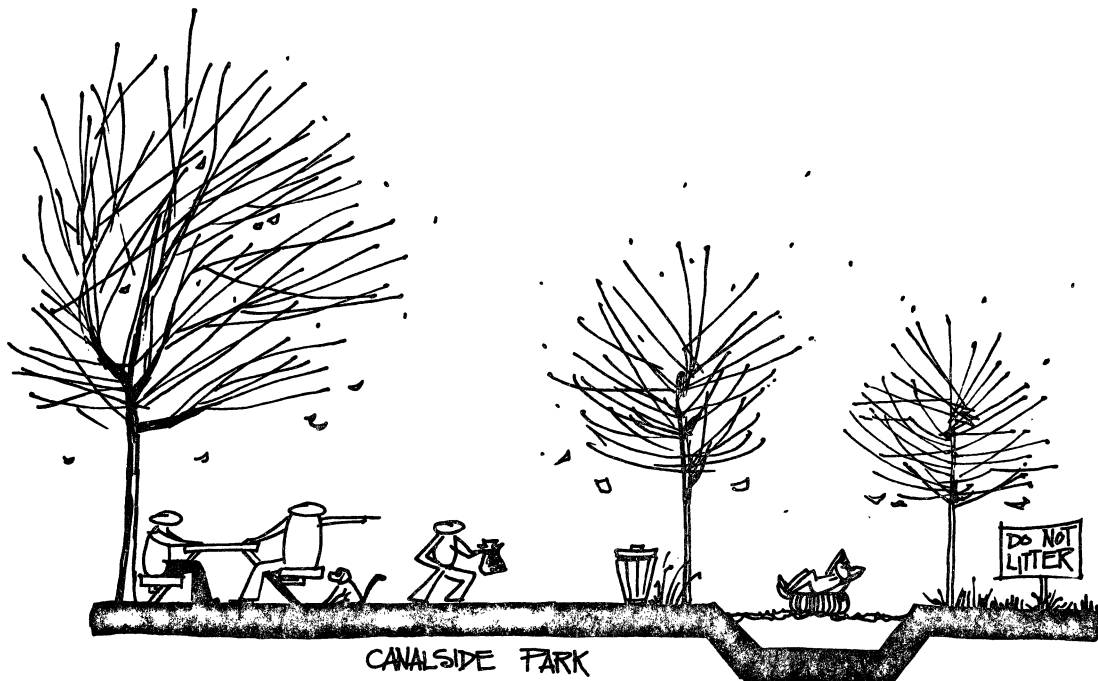
An argument could also be made for the neighborhood “mini-park” concept. All too often communities plan their park systems like their shopping centers and airports, with large recreational areas on the community fringe which require automobile commuting for most residents. Once there, dozens of other strangers are encountered, and one wonders about the park’s usefulness in promoting “a sense of community.”

Most children and adults can only relate to a few dozen people at one time, and it helps to know the people one encounters. Small neighborhood parks can help promote a sense of community by serving as congregation areas for neighbors of all ages to provide recreation, relaxation, and socialization. Many canal corridors already serve in this neighborhood park capacity.

Altering single-purpose design of canals

Changes in design to accommodate other canal uses can often be accomplished with small



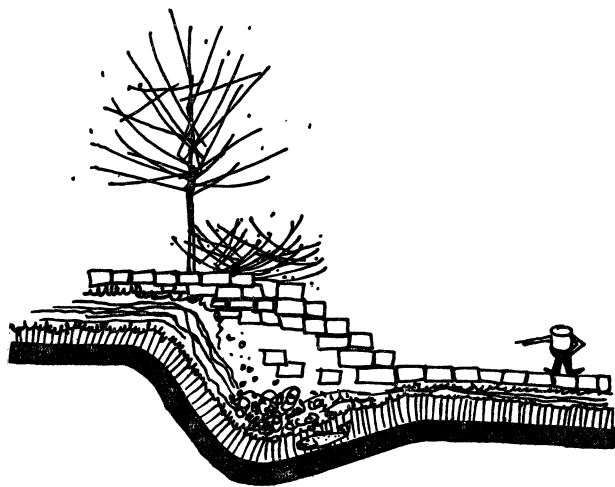


loss in irrigation efficiency. Many canals have such water volumes and flows that slight reductions in irrigation efficiency is of no consequence. Thus falls, pools, and other conduit alterations could be made without inhibiting the canal's irrigation function. Such construction changes might be considered when canals are improved or new systems constructed.

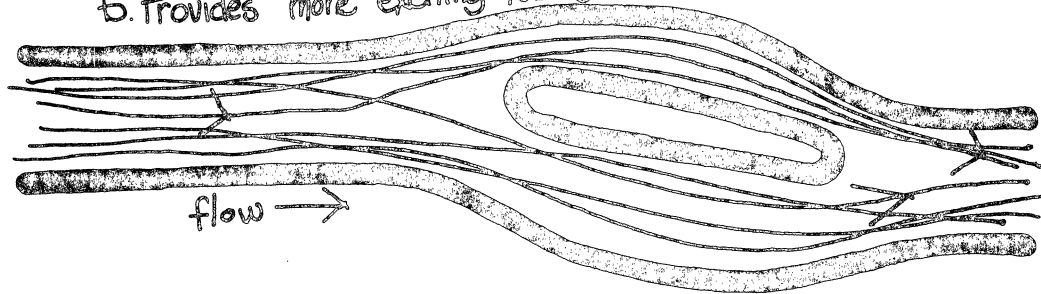
Canalside pools for fishing or wading and visual variety could often be constructed with little

reduction in irrigation efficiency. Small water falls could also add variety in visual use and improve fish habitat. Fish habitat could also be enhanced by rippled canal bottoms and occasional overhanging canal walls.

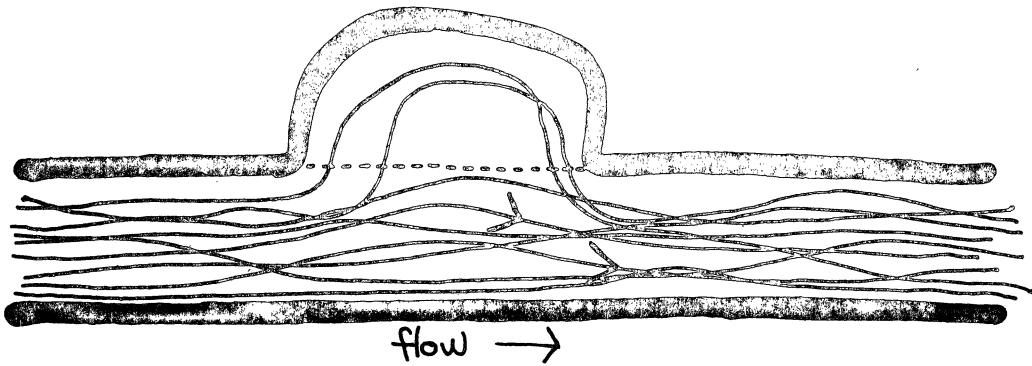
These suggestions are speculative and untested. But with the large public financing of water development such as the Central Utah Project, greater public values other than irrigation alone might be contemplated.



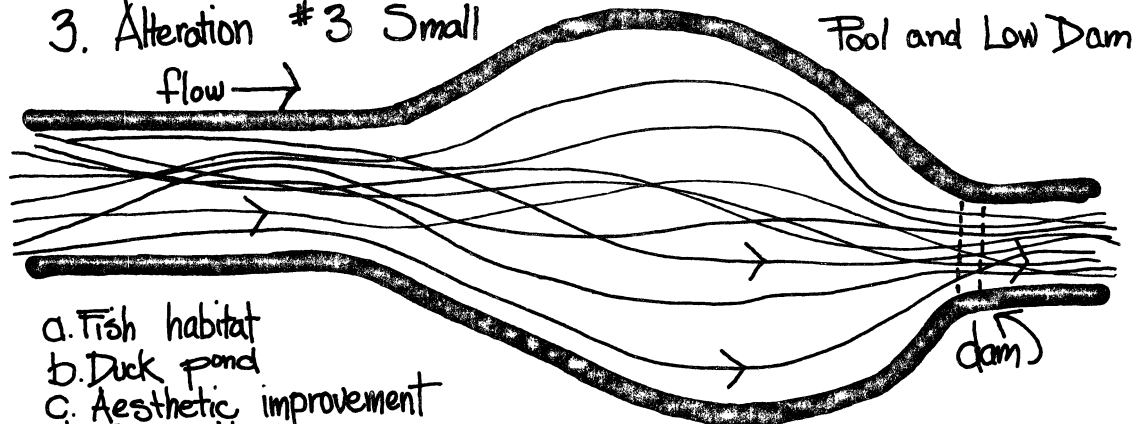
1. Alteration #1 Small Island
 a. Creates eddies for fish
 b. Provides more exciting tubing rides



2. Alteration #2 Wading Pool for Children



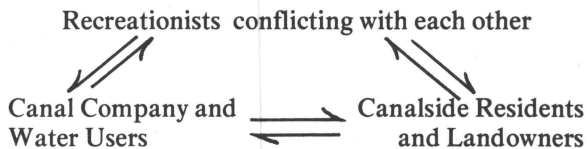
3. Alteration #3 Small



- a. Fish habitat
 b. Duck pond
 c. Aesthetic improvement
 d. Tubing ride improvement

Conflicts Resulting From Multiple Use of Cache Valley Canals

Returning to the present, this section examines the numerous conflict situations resulting from the many uses presently occurring on Cache Valley canals. Most of these conflicts occur between the following sets of actors:



Most conflicts in this "triangle" are not intense and might better be referred to as nuisance (e.g., noise to canalbank homes from child's play or tubing). Still some are rather severe (e.g., children getting cut above the eyes from a barbed wire fence strung across a popular tubing canal) and their frequency is probably increasing. Yet most of these conflicts can be minimized with changes in structures, management, and attitudes toward canals. These changes are not one-way streets, and must come from mutual cooperation of all the above factors. Some of the more common conflicts and possible solutions are offered below.

Conflicts between different recreation users

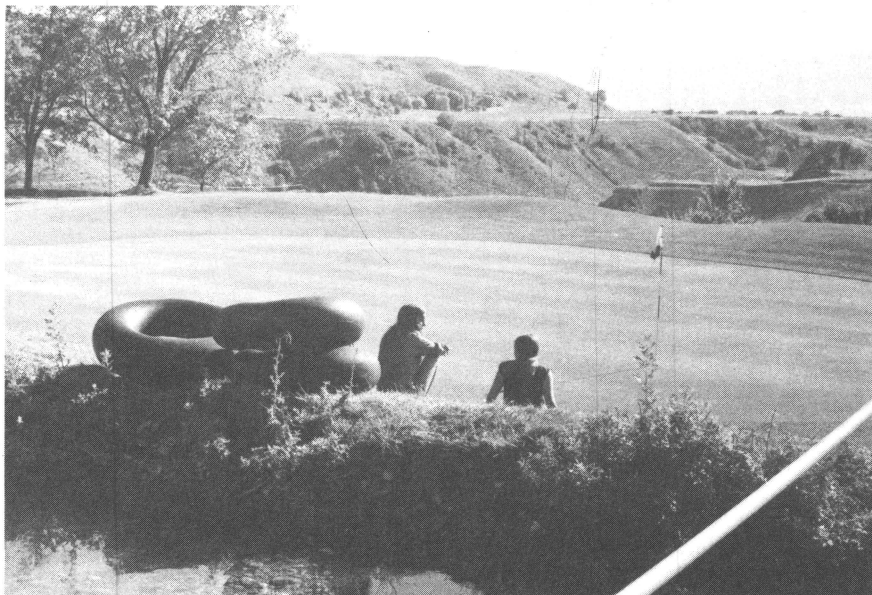
These conflicts are minimal at present but will probably increase in the future. Since motorcycles and snowmobiles use some canal rights-of-way,

there are occasional near-accidents. Some motorcycles travel certain canal paths at high speeds when trails are narrow and many small children play nearby. Most cooperative canal agreements in the west have found motorized use of canal banks incompatible with other recreation and have prohibited any such use. For example, see section 9(e) of Maricopa County, Arizona, and the Salt River Valley Water Users Association agreement in Appendix F.

Bicycling and horseback riding are more compatible uses of canal trails, but conflict can still result between these two user groups. At present this is not a problem in Cache Valley, but recreational canal trails in Maricopa County, Arizona, and suburban Denver have separated these users whenever possible. To begin with, horse travel is best suited to gravel paths, while bicycles require a more compact surface. High speed bicycles also surprise horses at times causing problems. There is also stereotype images of cowboys versus the bicycle ecology-folk that help fuel conflict on heavily used trails in the above mentioned examples.

A classic conflict between recreationists in Cache Valley occurs between tubers on the Logan-Hyde Park-Smithfield Canal and golfers at the

¹Anyone planning to combine horseback and bicycle uses on canal trails should consult with the Maricopa County Parks and Recreation Department, Phoenix, Arizona and the South Suburban Metropolitan Recreation and Park District, Littleton, Colorado.



Tubers on the Logan-Hyde Park-Smithfield Canal often dry out in the line-of-fire on a green of the Logan Country Club and Golfcourse.

Logan Golf and Country Club. Golf course bridges too low to float under, an impassable diversion dam, plus the need of tubers to thaw out some rather cold body parts, all combine to put numerous tubers on the course obstructing greens and blocking bridges. At one time the country club planned to prohibit tubing through the course, but the ownership-enforcement complexity of such a policy discouraged its enactment. These conflicts could be minimized, while still allowing joint golfer-tuber use of canal corridor. A following section of this chapter gives more attention to design and management solutions of this problem.

Conflicts between recreationists and canal companies

Much conflict between canal recreationists and the irrigation function of the system can best be classified as insult. Many company officials and water users recognize the public services their canal system provides and consider it "neighborly behavior" to allow such use. Their patience is greatly strained, however, by inconsiderate behavior of some canal recreationists. Tubers roll large rocks into canals to create more thrilling "whitewater," children create similar blockage with stone and rock dams, old rafts and deflated tubes clog headgates and trash racks, and spring cleaning of tree houses results in a string of trash floating down the canal. Some of this behavior inhibits canal flow or compounds its trashy appearance, some add to emergency situations canal presidents and their watermasters must attend to, and all compound the headaches and financial cost of canal operation. And all the company sees is the "negative costs." The public,

individuals, or public agencies rarely express their gratitude to canal companies. Many canal companies feel the public is taking advantage of them, and they are probably right.

Cooperative agreements between public agencies and canal companies can shift trash maintenance and control of users to the public, where it equitably belongs (see sections of Appendix F: Maricopa County and Salt River Valley Water Users Cooperative Agreement). The installation of litter barrels and signing of a public litter campaign might reduce trash problems. An immediate goodwill gesture would have the public pay a portion of the watermaster's salary for the extra maintenance work caused by canal recreation (since watermasters only receive a few thousand dollars, this would not be a large public expense and might set the stage for increased community-canal company cooperation).

Conflicts between canalside residents and canal companies

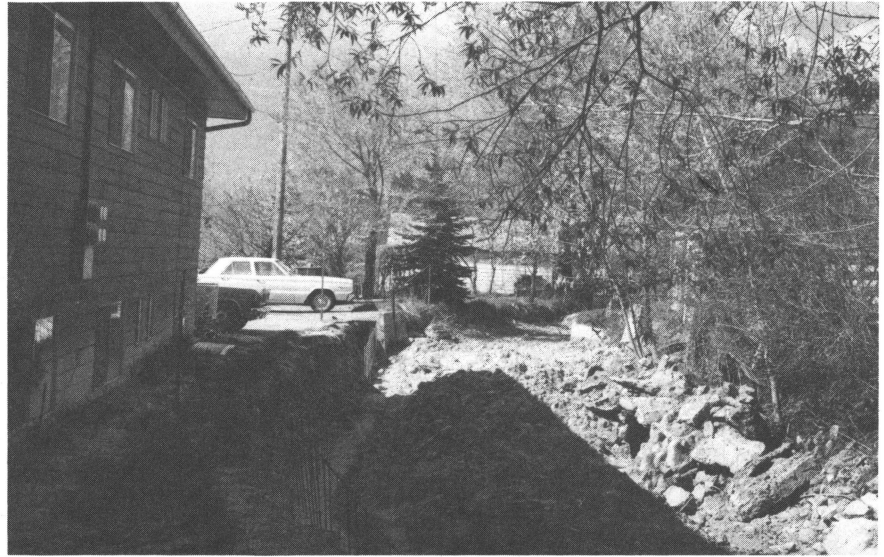
Much inconsiderate behavior of canal recreationists mentioned above originates with children. We found in our canal company interviews that, although these problems are costly and bothersome, company officials tempered their indictments of this behavior with allowance for juvenile behavior. This was not true when the subject of canalside homeowners came up.

Canal company officials appeared most incensed with the haughty attitude and behavior of the adults who own homes adjacent to canals, most of which consider canal banks their property.



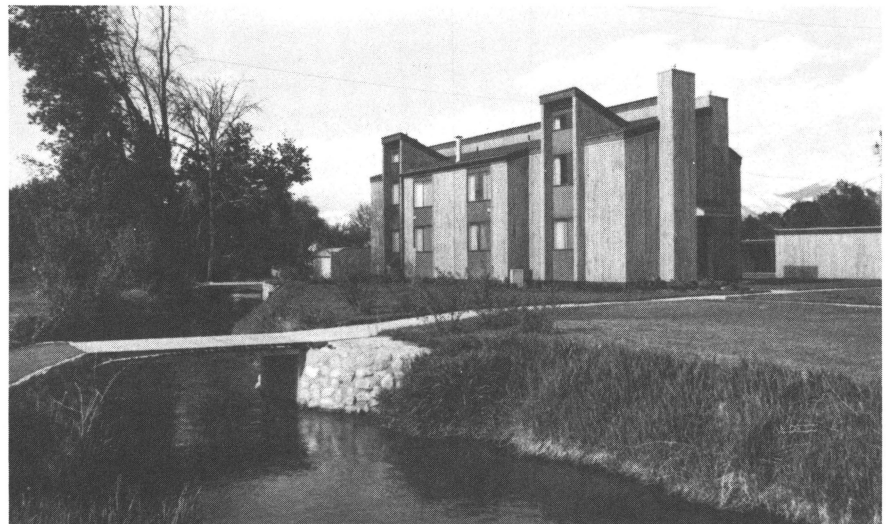
Caught in the act of emptying a can of garbage into the canal. Canal-side residents like this citizen, draw strong criticism from canal company managers.

Some apartment buildings crowd canals, blocking public and company access...



...others allow public access, but do little to capitalize on the canal environment...

...occasionally an apartment complex incorporates the canal as an important part of its character.



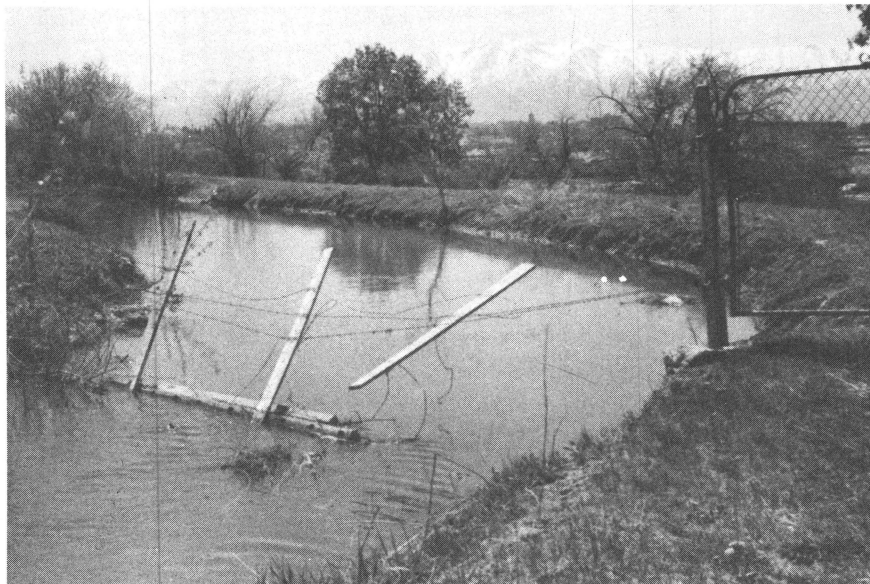
Fences and landscaped canal banks soon inhibit or block company access to their system. The magnitude of canal trash originating from bankside residents dwarfs that coming from recreational use. Floating piles of shrubbery, cut grass, and other yard debris are a common sight in canals; most canal company officials feel these adults should "know better."

Opening rights-of-way after they have been annexed by bankside residents is a difficult problem. Even when the city or irrigation company has legal title to the land, there will be great social and political strife in attempts to reopen some canals. As cited in Appendix B (Part 1) it is a misdemeanor for anyone to place an obstruction across a canal or water course without permission of the canal company. At minimum, canal companies

should protect themselves by immediate removal of any right-of-way barriers. As discussed in this section of Appendix B, bankside owners might also acquire title to canal banks by adverse possession, if public access is blocked for a number of years.

Conflict between recreationists and canalside residents

The same possessive attitude of canalside owners that causes conflicts with canal companies also creates problems with recreation use. Adult recreationists usually respect the territorial behavior of bankside residents, but children are less inclined. Some bankside owners have devised ingeneous tuber-traps. Still tubers climb in-under-and-around them, sometimes with injury to tuber and tube.



Obstructing canals or their rights-of-way is a misdemeanor under Utah law, but it goes unenforced creating hazards for tubers, bank users, and canal maintenance.

Possible Legal Constraints in Recreational Development of Canals

The legal research of this project is rather extensive; still, it should only be considered a starting point from which more intensive and specific investigation must proceed. Each canal company in Cache County would have to be considered a special case, with unique landownership, corporation bylaws, and stockholder situations. The legal search summarized here touches only on highlights. Appendix B presents a more complete review for the interested reader.

A general conclusion from our legal review is that any lasting cooperation between the public and canal companies cannot result from telephone chats between (say) a mayor and a canal company president. Issues and problems will have to be made public; canal stockholders, at least, must formally vote on any recreational proposal. The barriers to cooperative development of canals for recreation are a bit complex, but not insurmountable. Perhaps the major element in successful cooperation is fair and equitable compensation of canal companies by the public—both in monetary or insurance terms and by respectable behavior by canal users and public agencies responsible for user control. Some specific legal findings are presented below.

Ownership considerations

Most canal sections in and about Logan appear to be owned by the City (Book B of Deeds, Vol. II; Cache County Recorder, pp. 538-44). Canal ownership in rural areas of the county have not been associated with any legal documentation and have probably evolved by right of adverse possession (Appendix B, Part 1).

A more complete legal search would be necessary before cooperative recreational agreement with canal companies could be reached. Many company officials are anxious to settle and formalize their ownership rights; a cooperative title search between the company and (say) Logan City would be of mutual benefit and an excellent way to initiate cooperative behavior.

Liability for accident and injury

At present, canal recreational users would probably be legally classified as trespassers or licensees. If formal cooperation and public access were initiated, users would probably be considered invitees. Responsibility for accident or injury liability is greatest for invitees, but the owner or operator does not guarantee the user's safety in this or any case. The canal company (owner) or the city

(operator) would only be responsible to reduce any obvious hazards and provide adequate warning signs in dangerous situations. Some amount of reasonable user control might also be necessary (e.g., enforcement of a ban on motorcycle use of trails).

Certainly in any cooperative agreement, a public agency should accept major liability responsibility and finance liability insurance. Most public agencies already have such insurance for their recreational responsibilities and including canal use would probably increase the premiums slightly. For further discussion of liability problems, see Appendix B, Part 2.

Power of canal companies to enter into cooperative recreation agreements

Most canal companies are organized as non-profit corporations and their articles of incorporation must be registered with the Secretary of State. These articles and the corporate bylaws state the purpose and largely define the power given irrigation companies to act. Most irrigation companies define their purpose in a narrow, irrigation sense and could not legally expand them without amending its articles of incorporation and bylaws. For more information see Appendix B, Part 3.

To use a specific example, the Logan-Hyde Park-Smithfield Canal Company was reviewed. Reincorporated in May 1962, its stated purposes are: operating, maintaining, repairing, constructing, and reconstructing canals, ditches, dams, and other irrigation works and to do any and all things necessary or incident to carrying on the above purpose. It is also authorized to obtain water and water rights and to distribute water to its stockholders. These stated purposes give ample latitude for the company to carry out its irrigation functions but would not allow company development of recreation or a cooperative lease arrangement with (say) Logan City Recreational Department. In order to formally develop and control recreation on its canal, the stockholders of the Logan-Hyde Park-Smithfield Canal Company would have to approve expansion of its articles of incorporation to include recreational purposes; this requires acceptance by a two-thirds majority. These changes would have to be registered with the Secretary of State. We suspect this company is like most in Cache Valley and Utah.

Canal Company Officials' Attitudes Toward Recreations

Of the two sets of officials interviewed, one company had relatively little recreational use. This group of officials was less concerned about recreation problems and rather optimistic about future cooperation possibilities with city or county recreation interests. Company officials with a longer history of recreation problems tended to be more pessimistic and suspicious of public cooperation. Even if the city or county would accept recreation management responsibility and finance liability insurance, this company saw an official public trail system as increasing recreation use and recreation problems.

Canal companies know who uses their water, how much is used, and are rationally planning to improve irrigation efficiency in the future. Three quarters of the officials interviewed said they

"seldom discuss recreation problems at their meetings." We sensed that canal companies do not face their recreation problems as they do their irrigation problems. There is little or no recreation management by the companies and the future is hazy and out of their control. We believe if canal companies would analyze their future recreation problems as openly and rationally as they do their irrigation problems, then city-county cooperation might appear a reasonable solution. Even one of our more pessimistic canal officials closed the interview by reflecting, "since we can't stop it (recreation) anyway, someone may as well supervise it."

Since a majority of water users will have to approve any official recreation lease, more thought and analysis will have to be given this issue. It would be prudent for this action to begin immediately, before uncontrolled recreational use hardens company attitudes toward cooperation.

CHAPTER 6

CANALS AND COMMUNITY OPEN SPACE IN UTAH'S FUTURE—A CLOSING NOTE

“Although today there are fewer than 13 people per square mile in Utah, nearly 80 percent of the state’s population lives in less than 5 percent of the state’s acreage.” And so, the Utah Department of Natural Resources (1973:5) recognizes by statistics what most of its citizens do not see: that Utah is one of the most urban and congested states in the nation. Still, most of Utah’s people and its community-state agencies perceive themselves as rural. A few of the many reasons for this are (1) a strong attachment to the pioneer past, (2) immediate automobile access from Utah cities to public land, and (3) being able to view isolated and wild mountain peaks from most downtown Utah urban areas. So, why worry about neighborhood canals, a stream corridor, or the last undeveloped farm in the neighborhood—one can easily escape to the mountains on the weekend.

This “frontier image” is the opiate of many Utah urbanities. Several eastern states that are less urban than Utah sense their vanishing community open space and are fighting to save land nearer their homes. Many Utah urbanities are mentally or physically off to Fish Lake or the Uinta Mountains as a developer files for a zoning change on the last piece of open space in the neighborhood.

Unfortunately, a considerable number of Utah urbanites do not measure their access to open space in hours of automobile travel. The young and elderly, especially, calculate distances to park and open space in minutes of walking or bicycle time. In the daily lives of these people, the glamorous public real estate located only 1 1/2 hours drive

away might as well be in Alaska (Kennedy, 1972). There was a chance during the winter 1974 gasoline scare, that urban Utahns might begin to show more interest in **neighborhood** open space. But scarcity vanished with the spring and Utah’s urbanites are now escaping to the frontier.

We do not argue that this escape mechanism is bad in itself. But the euphoria it produces may inhibit the eleventh most urban state in the nation from waging the long, hard battle of creating humane cities and identifiable, enjoyable neighborhoods. We feel open space is part of a good neighborhood; not large parks or open space scattered at 4-mile intervals along the city’s main street, but smaller, better distributed space that is closer to one’s living room. As Whyte (1968:14) has argued:

The trouble with the generalized green belt approach is that it asks for too much land and without justifying it. We will not save much open space that way. In a chapter on linkage I argue that we must concentrate on the smaller spaces, the irregular bits and pieces, and especially those that we can connect together. There are an amazing number of connective links right under our noses if we will only look for them—old aqueducts, abandoned canals, railroad rights of way, former streams the engineers have put in concrete troughs.

Canals are one open space asset Utahns must fight to protect in the future. This will require increased public awareness of present and future recreation-open space values of canals. City dwellers of Utah cannot successfully pursue this struggle if they have their **eyes** up on the mountains as canals and open space disappear under their **noses**.

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Water Commissioner's Report. (These are reports for most of the state irrigation projects or distribution systems. We used many of these reports and have not listed all of them.)

APPENDIX A

IRRIGATION CANALS OF UTAH

Most of this research was done by T. Kadir, doctorate student in Agricultural and Irrigation Engineering, Utah State University. Major sources of information on Utah irrigation canals are:

1. U. S. Bureau of Census. 1952. *Census of Agriculture 1950* (Volume III: Irrigation of Agriculture Land). Washington, D. C.: U. S. Government Printing Office.
2. *Water Commissioner Annual Reports*. These are required annually of water commissioners for each Irrigation Distribution System and are available through the State Engineers Office, Salt Lake City. For an example of the Logan River Distribution System see Daines (1966).
3. U. S. Geological Survey Maps.

Table A-1 presents irrigation enterprises for the state and their appropriate length. Note that there is some double counting in illustrating U. S. Bureau of Reclamation (USBR) projects. Since USBR projects are financed largely from public funds, cooperative recreational-open space agreements with such canal enterprises may be more easily accomplished. Community and state cooperation with the USBR to insure that future canals are integrated into the landscape and recreational-open space planning also appears prudent. This is especially true for the Central-Utah Project; hopefully recreational consideration can be designed into this system rather than being added on as an afterthought as with the California Aqueduct. Considering the cooperative potential with the USBR, Table A-2 presents their projects in Utah.

Table A-1. 1950 Census of Utah Irrigation Canals and Ditches^a (U.S. Bureau of Census 1950, Volume II: Census of Agriculture).

Canals and Ditches	All Types	Single Farm	Mutual		District	USBR (Operated by water Users) ^b	All or part of water from USBR Projects ^{b,c}	Commercial Indian, State & Other
			Unincorporated	Incorporated				
Enterprises reporting	1,837	825	382	618	2	7	35	10
Total length, miles	9,621	1,427	920	6,141	41	192	1,831	1,092

^aOnly ditches to convey irrigation water to one or more farms or to other irrigation enterprises. Ditches used to distribute and apply the water on the farms are not included.

^bThese enterprises also included under "District" or other types of enterprises as the case may be.

^cNot including single-farm enterprises receiving water from Bureau of Reclamation projects.

Table A-2. U.S. Bureau of Reclamation Irrigation Projects in Utah as of 1970.

Project--Name of Canal	Length (Miles)	Initial Capacity (cfs)	Section Bottom Width (Feet)	Initial Reach		Const. Period (Cal. year)
				Water Depth (Feet)	Side Slopes	
Central Utah Project						
1. Starvation Feeder Conduit Outlet Channel	0.2	300	14	5.1	3:1	1967-1968
2. Steinaker Feeder Canal	2.8	400	16	6.1	2:1	1960-1961
3. Steinaker Service Canal	11.6	255	18	4.6	2:1	1961-1962
Emery County Project						
1. Cottonwood Creek-Huntington Canal	15.7	165	12	4	2:1	1963-1965
2. Huntington North Reservoir Feeder	0.3	100	8	3.4	2:1	1965-1966
3. Huntington North Service Canal	3.5	35	6	6	2:1	1965-1966
Hyrum Project						
1. Hyrum-Mendon Canal	14	89	4	3	1 1/2:1	1934-1935
2. Hyrum Feeder Canal	1.3	9	4	1.1	1 1/2:1	1934-1935
3. Wellsville Canal	5.2	15	4	1.5	1 1/2:1	1934-1935
Moon Lake Project						
1. Duchesne Feeder Canal	15	200	14	3.4	1 1/2:1	1934-1935
2. Yellowstone Feeder Canal	22.5	88	7	3	1 1/2:1	1938-1940
Newton Project						
1. East Canal	2	9	3	1	1 1/2:1	1946-1947
2. Highline Canal	4	18	3	1	1 1/2:1	1946-1947
3. Main Canal	0.6	25	4	1.8	1 1/2:1	1946-1947

(Source: "Statistical compilation of storage dams and reservoirs, Bureau of Reclamation Projects—File copies 30 June 1970"
U.S. Bureau of Reclamation, Salt Lake City, Utah.)

APPENDIX B

LEGAL INFORMATION ON CANAL COMPANY OWNERSHIP, LIABILITY

We had two years correspondence with Richard Allen, who during that period graduated from the University of Utah Law School and passed his state bar exams (currently with Senior and Senior Associates, Salt Lake City). The final communication consisted of a series of memos discussing potential

legal problems in any formal cooperation between public recreation agencies and canal companies. The following memos have been condensed and edited. They are presented here to serve as a starting point for further legal investigations or cooperative arrangements with canal companies.

Part 1

Title Problems of Developing Recreation Potentials of Canals

It appears that you have done some good work in investigating canal ownership, but a more exhaustive ownership search should be considered in further investigations. In this memorandum I hope to discuss some specific problems of developing canals for recreational use.

Canals Owned By Logan City

I have a small amount of concern about the 26 March 1872 conveyance which you sent me conveying title of some canals to Logan City (Book B of Deeds, Vol. II, Cache County Recorder, pp. 538-44). My first concern is the conveyance seems to be from the Mayor of Logan City itself, to the City of Logan. A conveyance from the city to itself is somewhat strange, but I presume that this is valid under the legislation cited therein. (Act of Territory of Utah, approved 17 February 1869, entitled "An Act Prescribing Rules and Regulations for the Execution of the Trust Arising Under an Act of Congress entitled 'An Act for the Relief of the Inhabitants of Cities and Towns Upon the Public Lands' approved by Congress 2 March 1864.")

Another concern I have is the canals or canal beds described are difficult to correlate with or identify as the canals set out on current maps of canals through

Logan City. It is possible that some canals involved are under a different name and others are not covered by the conveyance at all. Since the conveyance is dated 26 March 1872, it is likely that some canals have been built since this conveyance. In summary, I do not feel that it is safe to assume the city owns all canals within its limits, at least if that ownership is based solely on this conveyance. Because of this, it would be wise to determine what canal beds are actually covered by the conveyance or the possible existence of any other conveyance or law which would give title to Logan City.

You have also stated that canal companies cannot have adverse possession against Logan City or any public agency. This statement is generally true and any possible limitations to this general rule probably are not particularly important, but you should be aware of them. The law of adverse possession against cities and towns is found in §78-12-13 U.C.S. (1953). This provides in part, that:

No person shall be allowed to acquire any right or title in or to any land held by a town, city or county, or the corporate authorities thereof, designated for public use as streets, lanes, avenues, alleys, parks or public squares, or for any other public purpose, by adverse possession thereof for any length of time whatsoever . . .

In the case, **Pioneer Investment & Trust Co., v. Board of Education of Salt Lake City**, 35 Utah 1, 99 P. 150 (1909) the Utah Supreme Court held that the law, which preceded this law but was exactly the same, was limited to land held by cities and school districts for purposes which are set out in the statute. The court also said that the term "other public purpose" as used in the statute must be limited to things *ejusdem generis* (which means that the term applies only to uses of the same general kind or class as those specific uses mentioned). This means that if the city held property other than for uses set out in the statute, the property held by the city could be acquired by adverse possession. The question then becomes, does ownership of canals or canal beds fit in the purposes set forth in the statute? I feel that canals would fit in the statute's provision and would not be subject to adverse possession. The canals are a form of passage or highway of sorts and would at least fit in the category "for other purposes" as a general public use similar to those the statute set forth. It should be noted however, that canals or canal rights-of-way are not specifically mentioned and it is conceivable, though unlikely, that the courts would hold canals not covered. In the **Pioneer Investment** case, the Utah Supreme Court held that land held by a school district for sale as business property was subject to adverse possession and was not protected by the above statute.

By way of summary, it appears that Logan City has title to some canals and canal rights-of-way by the above conveyance, but it is unlikely that the above conveyance covers all canals now within the city limits. As to those canals and canal rights-of-way not covered by this conveyance, I have no basis for determining ownership. As to those canals and canal rights-of-way which the city does own, it is doubtful that canal companies have acquired title by adverse possession.

Ownership of Canals Established Before Adjacent Land Was In Private Ownership

Many Cache Valley canals were probably built before much of the area was conveyed to private owners. Most patents from the United States to private individuals and most conveyances of federal lands to the state contain a reservation similar to the following:

... subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights as may be recognized and acknowledged by the local customs, laws, and decisions of courts; and there is reserved from the lands hereby granted, a right of way thereon for ditches or canals constructed by the authority of the United States.

The above language is contained in all patents for lands taken up after August 30, 1890, under 43 U.S.C.A. §945 which provides:

In all patents for lands taken up after August 30, 1890, under any of the land laws of the United States or on entries or claims validated by the Act of August 30, 1890, west of the one hundredth meridian, it shall be expressed that there is reserved from the lands in said patent described a right of way thereon for ditches or canals constructed by the authority of the United States.

The courts have held that this reservation is not limited to reserved rights to ditches constructed before the patent was issued, but also authorizes ditches which may be constructed after a patent was issued. (**United States v. Ide**, 277 F. 373 affirmed 263 U.S. 497.) The other part of this reservation applies to ditches and canals built under the water laws and local customs of the area. The statutes dealing with these reservations are 30 U.S.C.A. §§51 and 52.

Under the above reservation and statutes involved, it is probable that canal companies have rights-of-way for their canals if they were constructed before the lands were patented to private individuals or before title to the lands passed to the State of Utah.

However, if rights-of-way of canal companies are limited to those granted under this statute, then rights-of-way are in the nature of an easement, not fee title, and it is limited to that use reasonably required to convey water. The rights-of-way cannot be changed or expanded to the detriment of the patentee or his successors in interest. Because of this, the rights-of-way under these reservations are, in all probability, not sufficient to sustain the use of the canal and canal rights-of-way for other recreational use, especially since the canal rights-of-way have never officially been used for parkways or other recreational purposes.

Canals Established After Adjacent Land Was Privately Owned

If the canals were built after the lands were patented to private individuals and were not built pursuant to laws of the United States as allowed by the above reservation, canal companies would have to acquire the right to canals and canal rights-of-way by a grant of some nature, by adverse possession, or by prescription. The question as to what grants of right-of-way may be given is not treated in this paper. It is possible that grants could have been given by a governmental agency or by a private landowner, and research of property books will be necessary to locate any grants.

In the absence of a grant or federal right-of-way, the question becomes whether canal companies have

acquired the rights-of-way by adverse possession or by prescriptive easements. Prior to 1943 a person or organization could acquire title to land by adverse possession by possessing property and claiming it as against all other persons for a continuous period of seven years. If canal companies built their canals more than seven years prior to 1943 and they occupied the premises to the exclusion of all others for a continuous seven-year period, then they probably acquired title to the lands in question by adverse possession. The main problem and question involved in this case is whether canal companies maintained exclusive possession of the rights-of-way. If canal companies allowed the adjacent landowners to fence and enclose parts or to otherwise occupy and use the canal rights-of-way, then canal companies probably did not enjoy exclusive possession necessary to entitle them to land title by adverse possession.

Since 1943, Utah statutes have required that a person claiming title by adverse possession must meet the above requirements and have paid all taxes which have been levied and assessed upon such land according to law, §78-12-12 U.C.A. (1953). This later requirement is a problem as §59-2-1 U.C.A. (1953) provides that water rights, ditches, canals, reservoirs, fire plants, pumping plants, pipes, and flumes owned and used by individuals or corporations for irrigating land within the state shall not be separately taxed as long as they are owned and used exclusively for such purposes. Article XIII §2 of the Utah Constitution contains a similar provision. Since these properties are not assessed or taxed to the canal companies, they probably can acquire adverse possession even though they have not paid taxes. As the Utah Supreme Court held in *Smith v. Nielson*, 114 U. 51 197 P. 2d 132, the above statute requires taxes be paid or that no assessment of taxes be made during the period of time taxes were not paid by the person claiming adverse possession. This conclusion is complicated by the fact that canal rights-of-way appear to be included in land shown in many adjacent landowner's deeds; these lands are probably assessed and taxed to adjacent landowners. Because of this, it is possible the courts would hold that canal companies have not acquired title by adverse possession—they have not paid the taxes which have been assessed on the property, the adjacent landowners have paid these taxes. This may be so, even though the lands would never be taxed to canal companies since irrigation properties are exempt from taxation.

I assume most canals involved were built prior to 1936. If this is the case and if canal owners did exercise exclusive and continuous occupation of the canal rights-of-way for seven continuous years prior to 1943, the above tax problem is not important. However, if there was not adverse possession before 1943, the above statute could create problems. In any event, a title by adverse possession is not finally

settled and title is not of record until there is a quiet title action.

Acquiring an easement or right-of-way under the prescriptive easement doctrine is not covered by statutes relating to adverse possession, and common law requirements are somewhat different than with adverse possession. All required for prescriptive easement is that the land be used as an easement (e.g., for a ditch or road), for a continuous period of 20 years, that the use is not interfered with or stopped during the 20-year period by the landowner, and the use not be pursuant to a grant or other permission. Since most canals have apparently been in existence for more than 20 years, it would appear they have a prescriptive easement if the use of the canal is not by a specific grant of right-of-way.

The main advantage to claiming title by adverse possession, as opposed to a prescriptive easement or an easement right-of-way under the federal law, is that adverse possession would give fee title of canal right-of-way to a canal company. They also could change and increase the use of their rights-of-way without being subject to damage liability caused to adjacent landowners; while under an easement they cannot substantially change or increase the use of the rights-of-way. Meeting the requirements of adverse possession may be difficult, however, especially where adjacent landowners have been and are still paying taxes on lands covered by the canal rights-of-way. It is likely that the courts will hold the canal companies have valid easements in most cases, but it may be difficult to establish title by adverse possession. If canal companies only have an easement to canal rights-of-way, title will probably need to be acquired before they can be used as recreational parkways.

Adverse Possession by Adjacent Landowners of the Canal Rights-Of-Way

Assuming that canal companies do have title to canal rights-of-way, the question then becomes: can persons whose property adjoins the canal rights-of-way, acquire title to parts of canal bed or rights-of-way by adverse possession? Since canal companies are not public agencies which are protected from having title loss by adverse possession, the general law of adverse possession applies. The law of adverse possession in Utah is clearly set forth in the statute. First of all, it should be noted that adverse possession requires continued occupancy of the property for seven years and payment of taxes by the person claiming adverse possession. As you have indicated in your letters, it appears that some landowners have probably been paying taxes on lands covered by canal rights-of-way, so the tax requirement would probably not present a problem in most cases. What is required in line of possession or

occupancy for the seven-year period varies depending on whether the claim to land is based upon a written instrument or not. If the claim to the title of the property in question is based upon a written instrument, then under §§ 78-12-8 and 78-12-9 U.C.A. (1953) the person is deemed to have possession or have occupied the land in the following cases:

1. Where it has been usually cultivated or improved.
2. Where it has been protected by a substantial enclosure.
3. Where, though not enclosed, it has been used for the supply of fuel or pasturage or for the ordinary use of the occupant or where a known farm or single lot has been partially improved, the portion of such farm or lot that may have been left not clear or not enclosed according to the usual course and custom of the adjoining county is deemed to have been occupied for the same time as the part improved and cultivated.

It appears that under 3 and 4 above, a person could acquire adverse possession to the canal right-of-way by fencing it or otherwise using it in such a way as would show he asserted ownership. However, it is unlikely that adverse possession would be allowed unless it was fenced or otherwise improved. Occupancy for adverse possession not founded on a written instrument or judgment is covered by §§78-12-10 and 78-12-11 U.C.A. (1953). These sections provide that occupancy or possession is established by:

1. Substantial enclosure of the property.
2. Cultivation or improvement of the property.
3. Labor or money has been expended on dams, canals, embankments, aqueducts or other bodies for the purpose of irrigating such lands amounting to the sum of \$5.00 per acre.

It is clear under these provisions that there would have to be a fenced or other enclosed improvement on the canal right-of-way before adverse possession could be established. I gather from your letters that many deeds of persons on the rights-of-way included lands covered by canals in their legal description, so their claim of title to canals would be based on a written instrument. However, I am not sure that this makes a great deal of difference and, in my opinion, it would be necessary for a person to fence or otherwise improve the canal right-of-way on his land before he could claim

adverse possession to it. I believe some canal companies usually remove all fences or obstructions to the canal rights-of-way. In this case, this would probably prevent property owners from acquiring title by adverse possession. However, if fences or other structures have been allowed to remain on canal rights-of-way for seven years, it is possible that persons placing the fences or structures there have acquired whatever title the canal companies may have had by adverse possession.

In this regard it should be noted that §73-1-15 U.C.A. (1953) provides:

Maintaining or placing any obstruction across a canal or water course without the permission of the person who has the lawful right or title to the canal or water course is guilty of a misdemeanor and is subject to damage and cost unless the water course is inflicting damage to the private property.

The fencing or building of structures on the canal rights-of-way by the private party, however, would not destroy what prescriptive easements the canal companies may have. It would be necessary to prevent canal companies from using the rights-of-way as a right-of-way or an easement for 20 years in order to destroy the company's prescriptive easement.

Since canal companies have, in most cases, been using the canals and rights-of-way in excess of 20 years, it is likely that courts would hold, whatever else canal companies have, they also have a prescriptive easement. The courts will in all probability not allow the canal companies' rights to use canals and rights-of-way to convey water for irrigation purposes to be lost by fencing, cultivating, or otherwise exercising control over canal right-of-way by adjacent landowners. However, this type of possessive conduct may provide a sufficient basis of adverse possession to adjacent landowners that they will be able to prevent the use of rights-of-way for parkways without compensation.

Conclusion

I trust that the above information will be helpful to you in working out title problems involved and I think these matters should be given serious consideration. I have probably not cleared up a great many matters and may have raised more problems than answers. But the title problems here are quite difficult and somewhat unique. Where the title to canals is not certain, the right of eminent domain could be used by the cities and counties developing canals as parkways when acquiring title or easement. Quitclaim deeds could be acquired from persons who might have title to parts of the canal and are willing to release their ownership. Quiet title actions are also possibilities where there are uncertainties.

Part 2

Liability of Canal Companies for Injuries to Persons on Canals or Other Properties Owned by the Company

A canal company's liability for injuries incurred by a person while on a canal or canal right-of-way is governed by the law generally relating to liability for injuries incurred by persons upon the premises of others. This area of liability law has been given treatment somewhat different from the general law of personal injury throughout the history of our common law. The origin of this difference relates back to the special significance and favorable treatment given to landowners in early English history. The special treatment is somewhat anachronistic in our present society, but is still followed by most courts in the United States.

This law is somewhat difficult to understand especially without a knowledge of the legal and historical background of the law. This paper will not attempt a thorough documented or legalistic analysis of this area of law. It will attempt to give enough background so a lay person can appreciate the problems of predicting potential canal company liability under various circumstances.

Under the law of liability to persons injured while on the premises of others, a different standard of liability is applied to the landowner depending on whether the person injured is determined to be a trespasser, a licensee, or an invitee. A basic understanding of each classification and the standard of liability applied to it is necessary in order to understand the potential liability of canal companies. For this reason the various classifications will be defined as simply as possible and will generally discuss the standard of liability or conduct required of landowners under each classification. I will then discuss the potential liabilities of canal companies under probable present circumstances and under circumstances that may exist if canals are opened up or developed for recreational use.

Definitions and Liabilities

In general the classification of persons on the property of others is based on conduct of the person on the premises, the purpose for which he is on that property, his relationship to the landowner or

occupant, and the action of the landowner or occupier himself. The reader should be forewarned that labels given to various classifications are somewhat misleading, thus attach the legal meaning to labels and avoid associating lay meanings to the terms involved.

(1) *Trespasser* - A person who enters or remains on the land of another without a privilege to do so is generally classified as a trespasser. This means he is on the property of another without any lawful authority or right, without an express or implied invitation or permission from the property owner and he is not on the property for purposes of performing a duty or conducting business with the owner or occupier. The standard of liability of a property owner is lowest towards a person determined to be a trespasser. It has been said that a trespasser enters the property of another at his own risk and the owner does not have a duty to keep his property in a safe condition or carry on his activity in a manner not endangering the trespasser. The only requirements of a property owner in regards to a trespasser is that he not set a trap for the trespasser and, if he knows that trespassers habitually intrude upon his property, he must refrain from acts which may reasonably be expected to cause injury to trespassers. As discussed later, a different standard is used for young children or infants who would normally be considered trespassers and a higher duty of care is required of landowners as to those persons.

(2) *Licensees* - If a person is on the property of another by the express or implied consent or permission the landowner or occupant, and if his presence is for his own benefit or advantage, and not for the advantage or benefit of the owner or occupant, he is generally classified as a licensee. The property owner or occupier's duty of care is only slightly higher to a licensee than to a trespasser. The landowner has no duty to keep his property in a reasonably safe and non-hazardous condition for use of licensees, but he must protect a licensee against natural or artificial conditions which he realizes amount to an unreasonable risk to the particular licensee. He also has a duty not to act to increase the hazards and dangers to the licensee without at least giving warning.

(3) *Invitees* - An invitee is generally someone on the premises for the benefit or business of the landowner or occupier. However, a number of cases (and probably the more recent trend of the law) is that a person entering property that has been open to the public and comes for the purpose for which it has been opened, is an invitee. An owner has a duty to exercise reasonable care to keep his premises in a reasonably safe and suitable condition for invitees. In addition, the owner must at least warn invitees of hidden or concealed perils which he knows, or should know in the exercise of reasonable care, to keep invitees from being unnecessarily exposed to unreasonable danger. However, the owner or occupant of a premise is not an insurer of the invitees safety on his premises and, in absence of owner negligence, there will be no liability for injuries to invitees.

Potential Liability of Canal Owners Under Present Circumstances

Before discussing potential liability of canal owners, it should be noted that there is, of necessity, a great deal of uncertainty in discussion of division lines between classifications of persons on the premises of others. These classifications are not always clear-cut and the standards of liability imposed on landowners are rather nebulous in the abstract—they only take on real meaning when applied to specific cases. The remainder of this paper, however, will attempt a general discussion of potential liability of canal owners to persons on canal properties under anticipated circumstances.

Under present circumstances most people using the canal and surrounding right-of-way are likely trespassers, most people who float down canals on inner tubes or travel along the canal right-of-ways do not have permission or a right to be there. However those persons who are properly on the canal or its right-of-way for the purpose of securing water have a right to be there, as do persons who are otherwise involved in canal company business, and they are not trespassers.

If persons using the canal are trespassers, then they are on canal property at their own risk and the chance of canal companies being held liable for injury is minimal. One potential area of concern here is the law that provides if an owner knows trespassers habitually intrude on his property, he must refrain from acts which may reasonably be expected to cause injury. In many cases trespassers habitually intrude on canal property for such purposes as floating down canals or walking maintenance paths, all of which is probably known to canal owners. Thus canal companies could be liable for any of their acts which may be reasonably expected to cause injury to these types of trespassers. It may be certain water

diversion practices or building certain structures on canals could be acts which reasonably could be expected to cause injury to trespassers. In this case canal companies could be liable for any injuries resulting from such conduct.

Another pertinent principle of law relating to trespassers is a property owner may not set a trap for a trespasser. If a canal company unwisely uses devices such as barbed-wire fences over canals or other hazardous devices to discourage trespassers from using the canal, these devices may be considered traps and the company could be liable for injuries resulting therefrom.

Discussion of potential liability of canal companies towards trespassers would be incomplete without mention of special treatment the law gives to trespassers who are young children or infants. The law has recognized that young children may be incapable of recognizing the dangers of certain conditions. In order to give these children protection, many courts have adopted what is termed the attractive nuisance doctrine.

There is a great deal of difference in regional application of the attractive nuisance doctrine, but most jurisdictions recognize the doctrine for children in a limited manner. The approaches of various courts on treatment of infant trespassers are of two kinds.

The older or traditional attractive nuisance approach requires that before a landowner be liable for injury to children on his property that:

- (1) The dangerous condition or instrumentality which causes injury must lure or attract the child onto the landowner's property;
- (2) The danger involved is concealed or unknown to the child; and
- (3) The landowner should have reasonably foreseen or anticipated that the condition was likely to cause injury to children in the area.

The second and more modern approach is that a property owner will be liable to injuries caused to children, if:

- (1) There is an artificial condition on the land;
- (2) The landowner knows or has reason to know that children are likely to trespass;
- (3) The landowner knows or has reason to know that the condition creates an unreasonable risk of harm to such children;

- (4) The children do not discover or realize the risk involved because of their youth;
- (5) The utility to the landowner of maintaining the dangerous condition is light when compared to the risk involved; and
- (6) The landowner fails to exercise reasonable care to eliminate the dangerous condition or otherwise protect children.

The main difference is that the traditional approach requires the child to be enticed or lured onto the property by the dangerous condition. This condition does not have to hold under the modern approach.

The Utah Supreme Court has recognized and followed the first approach of attractive nuisance and has held landowners liable for injuries caused to children if dangerous conditions tempt or induce young children onto the premises, or the landowner knew that children habitually used property with dangerous conditions thereon as a playground. However, the Utah Supreme Court has specifically held that the doctrine of attracting nuisances does not apply to canals or artificial bodies of water. Apparently, this applies to conditions which would make landowners liable under either attractive nuisances approaches. In holding that attracting nuisances doctrine does not apply to canals, the court recognized the great number of canals in Utah and their importance to the state's economy. Because of this condition, it is likely that canal owners will not be held liable for injury or death of infant trespassers. It should be kept in mind, however, that canal companies by their actions could make children licensees or invitees and thus increase the risk of liability for injury. It should also be noted that the law of negligence and the court is very flexible and if facts or apparent justice of any individual case warrants, a court could hold a canal company liable for injuries to a child even though termed a trespasser. Remembered also, that the law in this area is in a state of change and the direction is toward more landowner liability, especially in the case of young children.

The action or even lack of action of canal companies towards people who use the canal for tubing, swimming, or other recreational purposes could result in these persons being considered or classified as something other than trespassers. A person who has the right or privilege to be on the properties of another is not a trespasser and a person may become privileged to be on the property of another by several means including receiving express or implied permission of the owner or occupant to enter upon the premises. While the more toleration of trespassers does not usually amount to express or implied permission resulting in trespassers have a privilege or right to be on the property of another, it

is possible that when a landowner tolerates and acquiescences in repeated trespassers with knowledge, the circumstances may be so pronounced as to amount to an implied invitation—thus granting a privilege to be on the property. If there is a great deal of canal use for tubing, swimming, and other recreational purposes and a canal company consistently acquiesces or allows this use without objection, this possibly could be interpreted as an implied invitation. The persons using the property would then most likely be considered licensees. A canal company's risk of a liability is not greatly increased by the change from a trespasser to a licensee, but it is increased. Canal companies must protect users who are considered licensees against natural or artificial conditions which they realize create unreasonable risks to those users, and they have a duty not to act so as to increase hazards or dangers to the licensees without at least giving warning as to the increase. Thus, there is a possibility that canal companies will increase their liability if people are allowed to habitually recreate on canals. This is especially true where there are hazardous conditions on the canal which creates unreasonable risk to users, and the company does nothing to correct these conditions or at least give adequate warning. Such conditions as fences or other obstructions across canals or currents and undertows caused by diverting water are possible unreasonable hazards to canal users.

Every canal company desiring to keep its liability for injuries to a minimum should do what it can to object to and prevent its use by tubers or swimmers (especially if it knows that people make habitual or regular use of the canal for such purposes).

In conclusion, under present circumstances (i.e., where the canal is not opened up and the public is not invited to use the canal for recreational purposes) there is not a great deal of risk that canal owners will be liable for injuries to persons who are on the canals. The risk or areas of concern discussed above should be considered, but their proper perspective is that—though there are risks—they are not very great.

Potential Liability If Canals Are Opened As Public Recreational Facilities

If companies open their canals to the public and develop them as parkways for recreational purposes, persons using them for these purposes will most likely be considered invitees. The duties and potential liability of canal companies will consequently be increased.

As noted earlier, invitees are generally considered persons coming on the premises for the benefit of the owner's business, still a number of

courts have held that when the invitation is to the public at large or when there are other circumstances implying that reasonable care has been exercised to make the premises safe, then persons using the property for the purpose that it was open to them will be considered invitees. The Utah Supreme Court has held in at least one case that a person who is invited onto the premises of another could be an invitee even though he was not on the premises for the owner's benefit or advantage. The scope of this case is not clear, and Utah law is definitely not settled in this matter. However, it would be unwise for a landowner who invites the public at large to use his premises to not take precautions that the law requires of a landowner in regards to invitees. Thus if canals are opened as parkways and recreational facilities, the companies and others involved should keep the property in reasonably safe and suitable condition for the recreational users and also warn them of any hidden or concealed dangers.

Maintaining canals and properties in reasonably safe, suitable conditions will not require owners to remove all risks because water sports and water recreation always have some inherent risk or danger. Yet canal companies or other operators should remedy situations or circumstances that would create risks or dangers that canal users would not normally anticipate or expect.

The canal companies may be able to protect themselves by giving adequate and proper warnings of hidden perils instead of rectifying those dangers. However, when premises such as these are open to the general public, including young children, the adequacy of a warning of hidden perils is often difficult to predict and canal companies would be well advised to try and correct the dangerous conditions where possible rather than rely on warning alone as a means of protection from liability.

It can be seen that opening a canal for recreation will put affirmative duties on the canal companies to

make areas reasonably safe. The reasonably safe and suitable standard is not a particularly difficult standard to meet but it does increase the potential for liability a great deal from that which would exist under present canal conditions. It should also be remembered that opening the canal for public use would not only increase the standard of liability, but also put more people on the canal and greatly increase the possibility of accident and injury. These additional risks should be anticipated and planned for.

Because of the increased injury and risk liability, if canals are opened for public recreation, several things should be considered to protect the operator of the parkway and the canal companies. One such measure would be to employ people to remedy any conditions that may be unsafe and to continually maintain the property in a reasonably safe condition. Personnel may also be necessary to police recreationists and prevent them from creating risks to other users of the canal. Liability insurance would also be advisable.

A canal company could be held jointly liable as owner of a canal property even if a canal parkway is maintained by another agency. For this reason a company would be well advised to require any agency it allows to develop and maintain the property as a parkway to have insurance that could be used to indemnify the canal company for any potential liability.

Conclusion

While opening canals as parkways would increase canal company liability risk and would increase the likelihood that injuries will occur, proper measures can be taken which would actually reduce canal liability risk below its present level. For this reason problems of potential liability should not be a serious deterrent to development of canals as recreational parkways if proper precautions are taken.

Part 3

Powers and Limitations of Canal Companies

In considering proposals to develop canals and canal rights-of-way as recreational areas or parkways, the question of powers and limitations of canal companies and their general legal status may become important. There may be limitation to a canal company's power or ability to undertake certain projects or to enter into contracts of the kind necessary. The powers or limitations on powers of canal companies are controlled by a number of factors including their legal status, powers granted by those controlling companies, and controls exercised by state or other governments. These factors will vary from company to company and this paper will only examine factors of general applicability to most Utah canal companies.

Most canal companies in Utah are organized and operate as non-profit corporations. The law in Utah relating to non-profit corporations is rather limited and to a large extent the power, purposes, and limitations of non-profit corporations are left to corporations themselves by means of their articles of incorporation and by laws. This paper will first discuss the status, powers, and limitations of canal companies organized as non-profit corporations. Then, since a great amount of power and limitation definition are left to corporations themselves, the paper will examine and discuss the powers of a specific canal company, the Logan-Hyde Park-Smithfield Canal Company. This company was selected because its canal is one with much recreational use at present and has future development potential. I will also discuss potential problems involved if canal companies are operating without being formed in a proper manner, as well as some problems relating to the powers and limitations of canal companies which do not relate to their legal status.

Powers and Legal Status of Non-profit Corporate Canal Companies in General

Most of the law relating to non-profit corporations in Utah is found in Chapter 16-6 U.C.A. (1953). This law provides only minimal amount of regulation over the existence and operation of non-profit corporations,

giving broad powers to these corporations to define and regulate their own affairs by means of their articles of incorporation and bylaws.

Under the Utah law, any corporation whose object is not to make pecuniary profit may be organized as a non-profit corporation for any lawful purposes or purposes, §16-6-21 U.C.A. (1953). A non-profit corporation obtains legal existence by filing articles of incorporation and obtaining a certificate of incorporation from the Secretary of State, §§16-6-47 and 48 U.C.A. (1953). Articles of incorporation of a non-profit corporation set forth a number of items required by law including: purpose or purposes for which the corporation is organized, and any provisions not inconsistent with law which the incorporators elect to set forth in the articles of incorporation relating to the powers of the corporation, §16-6-46 U.C.A. (1953). However, §46-6-46 of the Code provides that it is not necessary to set forth in the articles of incorporation any corporate powers that are given by the non-profit corporation laws.

Non-profit corporations are also given power to make and alter bylaws or resolutions not inconsistent with its articles of incorporation or with the corporation laws of the state. The general powers given non-profit corporations include: right to enter into contracts, to sue and be sued, to purchase or sell property, and to lend or borrow money for their corporate purposes.

One limitation in the powers of any corporation, which is especially important in dealing with irrigation companies in developing recreational areas or parkways on the canals, is the limitation set forth in Article XII, Section 10 of the Utah Constitution. This section provides: "No corporation shall engage in any business other than that expressly authorized in its charter of articles of incorporation." It is very likely that articles of incorporation of most canal companies designate their purpose in a narrow sense which provides only for activities necessary to supply water to uses involved. Thus if canal companies undertake activities relating to developing recreational facilities, when their stated purpose or business is limited to

supplying water, the action would probably be considered outside the scope for which the corporation was incorporated and would run afoul of this constitutional provision. In the case, **Union Pacific Railroad Co., v. Trustees, Inc.**, 8 Utah 2d 101, 329 P.2d 398 (1958), the Utah Supreme Court said that strict interpretation will be given to the express corporate powers except as to implied powers incidental to and connected with accomplishing the general purposes of the corporation as expressed in the articles of incorporation. In **Zions Savings Bank and Trust Co., v. Tropic and East Fork Irrigation Co.**, 102 Utah 101, 126 P.2d 1053 (1942), the Utah Supreme Court took a very narrow position and stated that a company authorized to construct canals between certain points and keep them in repair could not purchase water or water rights. Because of this provision and strict Utah Supreme Court interpretation, there could be a great deal of difficulty in dealing with canal companies in recreational development unless they expressed in their articles of incorporation broader purposes than just providing water to the water users. It is possible that if canal companies' only participation is to lease canal properties to another organization to develop as recreational facilities, or to enter into other contracts which do not directly involve them in developing canals for recreational purposes, these actions will not violate the above constitutional provision.

If a company desires to enter into a lease or contract to allow others to develop their canals as recreational areas or desires to directly participate in such activities, this can be accomplished by having its articles of incorporation amended to include such purposes or purposes closely related to development of the canal recreational potentials. In order to amend a canal company's articles of incorporation where there are members with voting rights, as with most canal companies, written notice must be given to voting members of the proposed amendments and there must be a $\frac{2}{3}$ majority vote in favor of the amendment, §16-6-150 U.C.A. (1953). This requirement is not extremely burdensome as it is likely that canal companies would be unwilling to enter into any such activities or agreements unless they did have the support of most of its members. However, it is a matter that must be considered and taken care of before canal companies can engage in this area. The formalities of filing the amended articles of incorporation and receiving a certificate of amendment from the Secretary of State are simple and easy to meet. They are set out in §§16-6-51-53 U.C.A. (1953).

If the purposes of canal companies are broad enough to include development of their canals as recreational facilities, then most canal companies have ample powers to enter into any type of relationship or activities necessary to accomplish this objective,

unless the corporations themselves limited their powers by their articles of incorporation or bylaws.

Another important consideration in analyzing the powers of a canal company in developing its canals as recreational areas is that most companies have the right to assess their stockholders for funds needed to maintain canals and supply water. Section 16-4-4 U.C.A. (1953) provides that canal companies or other water supply companies may assess the shares of stock in the manner provided by their articles of incorporation. Section 16-4-24 U.C.A. (1953) provides that canal companies and other similar organizations can assess stockholders or water users on other than a pro rata basis. Even if a canal company's stated purpose and general powers are broad enough to enable it to engage in developing its canal recreational potential, it would seem wrong to assess stockholders (who had stock in the corporation solely to secure water for personal use) for such development funds. It is very unlikely that canal companies would be willing to do this, and such action could probably be successfully challenged by the stockholders.

Since canal companies organized under non-profit corporation acts are private corporations, they do not have power to tax and probably cannot be given that power (Article VI, § 29 of the Utah Constitution provides that the legislature shall not delegate to private corporations or associations the power to levy a tax). This means the canal companies will have no way to raise the money needed to develop canal recreational potential except by outside sources or by charging those who use the canal. Attempting to charge users would probably be difficult and expensive, so in all probability the financing of such activity would need to come from outside sources.

Canal companies would have problems in financing recreational development of their canals and are, in most circumstances, limited in their interests and their administrative capabilities. Thus, it would seem wise for another organization to develop and operate recreational facilities on canal property by leasing or otherwise contracting for the right to use the canal property and water for such purposes. Certain measures will need to be taken in many instances before the canal companies will even be able to enter into such lease or contractual relationships, since many of the shareholders and operators of the various canal companies are farmers whose area of interest are likely to be limited to providing water for their irrigational needs. Since development of canals for recreation may put an increased burden on canal companies, it appears that steps must be taken to make such an arrangement attractive and profitable to canal companies and their stockholders.

One power that may be necessary and important to a canal company or any organization attempting to

**Powers and Authority of the
Logan-Hyde Park-Smithfield
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develop their recreational potential would be the power to condemn and take, by paying just compensation, the properties of others for public use. Since canal companies organize as non-profit private corporations, they will have only those powers of eminent domain given them by state laws. Section 78-34-1 U.C.A. (1953) provides that the right of eminent domain may be exercised for public uses which are listed in that section. One such use listed here is:

Reservoirs, dams, water gates, canals, ditches, flumes, tunnels, aqueducts and pipes, for the supplying of persons, mines, mills, smelters or other works for the reduction of ores, with water for domestic or other uses, or for irrigation purposes or for the draining and reclamation of lands or for the floating of logs or lumber on streams not navigable.

Elsewhere the statute lists:

Canals, reservoirs, dams, ditches, flumes, aqueducts, and pipes for supplying and storing water for the operation of machinery for the purpose of generating and transmitting electricity for power, light, or heat.

Also the water laws of the state provide in §73-1-6 U.C.A. (1953) that:

Any person shall have a right of way across and upon public, private and corporate lands, or other rights of way, for the construction, maintenance, repair and use of all necessary reservoirs, dams, water gates, canals, ditches, flumes, tunnels, pipelines and areas for setting up pumps and pumping machinery or other means of securing, storing, replacing and conveying water for domestic, culinary, industrial and irrigation purposes or for any necessary public use, or for drainage, upon payment of just compensation therefor, but such right of way shall in all cases be exercised in a manner not unnecessarily to impair the practical use of any other right of way, highway or public or private road, or to injure any public or private property.

From the above provisions it is apparent that a private cooperation or individual can exercise the power of eminent domain for construction of reservoirs, canals and other water structures. However, the purposes for which this power may be exercised probably might not include recreation. Section 73-1-6 provides that eminent domain may be exercised for structures needed for water for any necessary public use. It is possible that "necessary public use" would be broad enough to include recreational development, but it is unlikely the courts would expand this power of eminent domain in private individuals to include the development of recreational sites. Another reason why it would be better for some state, county, or city organization to undertake the development of parkways on the canals and canal rights-of-way is their powers of eminent domain are broad enough to include developing public recreational areas.

The Logan-Hyde Park-Smithfield Canal Company is a non-profit corporation which was re-incorporated in May 1962 and is subject to the general laws relating to non-profit corporations discussed above. Article III of the Articles of Incorporation of this corporation provides that it is organized for the purpose of operating and maintaining, repairing, constructing, and reconstructing canals, ditches, dams, and other irrigational works and to do any and all things necessary or incident to carrying on the above purpose. It is also authorized to obtain water and water rights and to distribute waters to its stockholders. This article expressly sets the powers to incur indebtedness and enter into various contracts and other powers to carry out the above stated purposes. Article VII (C) of the Articles of Incorporation give the directors the power to make bylaws for operation of the corporation, but requires a 10 percent vote of the outstanding stock to change bylaws. The articles limit the corporation's power to borrow money to \$10,000 without express authority given by a majority vote of stock of the corporation. The articles also give the board of directors the right to levy and collect assessments on stock of the corporation for all corporate purposes including, but not limited to, the expense and operation of maintaining corporation distribution system, the cost, construction, repair, and replacement of water distribution facilities, salaries, and expenses of officers and employees, and for reasonable service charge to be levied on each stock owner without regard to number of shares of stock held.

From the general summation of purposes and powers of the Logan-Hyde Park-Smithfield Canal Company, it has ample and broad powers to carry on the purpose of acquiring and distributing water to its stockholders. However, it seems clear that this corporation could not enter into the development of canal recreational facilities or even enter into leases or contracts for such activities because of the limited purposes set forth in the corporation's bylaws. Because of this, it will be necessary, or at least wise, to have the Articles of Incorporation of this canal company amended before the canal is developed as a recreational area or facility. This is true even if the canal company does not itself develop the area but enters into a lease with another organization. Since a $\frac{2}{3}$ vote will be required in order to amend the Articles of Incorporation, it will probably be necessary to make such a proposition attractive to shareholders and a good selling job initiated.

The Articles of Incorporation of the Logan-Hyde Park-Smithfield Canal Company are probably

typical of most canal companies organized under the non-profit corporation laws of this state. The same problems involved here will most likely be involved in all such corporations.

Canal Companies Not Properly Incorporated or Organized Under Other Laws of the State

In checking records of the Secretary of State's office, it appears that some canal companies in the Logan area are not properly incorporated as non-profit corporations and are not organized under any of the other special state laws relating to irrigation or water conservancy districts. Because of this, there will be special problems involved in contracting or otherwise dealing with these corporations in development of their canals and rights-of-way. If these companies are not properly organized under state laws, they do not have a legal existence separate and apart from individual shareholders or water users. Because of this, it would be unwise to try and contract or otherwise deal with the canal companies separate and apart from the stockholders or water users. Contracting with each and every water user in a canal company could be a difficult process and the easy solution would be to encourage and help the canal companies properly incorporate under non-profit corporation laws. As noted earlier, the incorporation process is simple and inexpensive and offering to help such a canal company incorporate may be a means of getting the company to enter into leases or contracts allowing for the development of its canals and rights-of-way. A problem of not being incorporated, which should be of concern to the users or stockholders of unincorporated canal companies, is that any liability incurred in the operation of canals may have to be borne by individual shareholders and they will not be protected from individual and personal liability in the same way as if they were incorporated.

Conclusion and Recommendation

As noted, there are limitations on the powers of canal companies organized as non-profit corporations which can create problems in canal development for recreational purposes. These problems will not be great if the role of canal companies is limited to leases or other agreements allowing others to develop the canals. But even in this limited role, changes will be necessary in the articles of incorporation of most canal companies. For this reason, it will be necessary to convince the individual stockholders that this is to their benefit or in some way sell the idea to achieve a $\frac{2}{3}$ majority vote necessary to amend the articles of incorporation.

When limitations on the powers of canal companies are coupled with the propriety questions of an irrigation company developing its property for public purposes (with the limited administrative and financial resources of these companies), the best approach would be for a state, county, or city agency or some specially organized agency to develop and operate parkways on canals and canal right-of-ways under canal company leases.

The above discussion does not apply to institutions which supply water, but are organized under special laws of the state, such as, Irrigation Districts organized under Chapter 73-7 U.C.A. (1953), Metropolitan Water Districts organized and established under Chapter 73-8 U.C.A. (1953) and Water Conservancy Districts organized under Chapter 73-9 U.C.A. (1953). These organizations are formed by strict compliance with the statutes involved and usually require elections or court action or both in their formation. These organizations are generally given power to tax and broader powers of eminent domain than are given to private irrigation companies. The laws relating to each of these public agencies are case specific and special reference will have to be made to the laws of each case to determine their powers and limitations in relation to recreational development of their canals.

Part 4

Laws Relating to Governmental Institutions

This memorandum is a conglomeration of various laws and considerations which may be involved in developing canals as parkways, especially if they are developed by city, county, or other units of local government. As noted previously in the report on the powers and limitations of canal companies, the best approach in developing canals and canal rights-of-ways for recreational and park use would be for canal companies to enter into lease or use agreements with governmental units who would develop and operate the parkways. There are a number of legal and practical reasons for this recommendation. First of all, there may be some serious legal limitations as to canal companies' real ability to undertake such an operation. More important, however, canal companies are financed by the individual shareholders or water users so they can obtain water needed for irrigation or other uses. It would be inequitable and probably impossible to get shareholders to bear the increased financial burden involved in developing parkways on the canals. It is possible that parkway development could be financed by a user charge of some nature that would be hard to administer and police. It would also probably necessitate fencing much of the area which would tend to eliminate one of the great values of developing canals as parkways—wide and easy access. The city, county, or other unit of local government, on the other hand, could develop parkways and pay for them by taxing the populous at large and allowing free access of the public. These parkway facilities would be enjoyed by the local population and taxing them for such development would seem to be proper, equitable, and legal. The laws of Utah specifically give authority to cities, towns, school districts, or counties to acquire properties for and develop recreational facilities in §11-2-1 U.C.A. (1953), and cities are given authority to establish parks in §10-8-8 U.C.A. (1953). §11-2-6 U.C.A. (1953) provides that school districts, cities, towns or counties may join together in purchasing or developing recreational facilities and §11-2-7 U.C.A. (1953) provides that these agencies may pay for such appropriate the raise money for such purposes by taxation.

It may seem meaningless to quote the authority by which cities and counties can maintain recreational facilities, but it is important. The Utah Supreme Court

has said that municipal corporations and counties can exercise only the powers (1) granted in express words, (2) those necessarily or fairly implied or incident to the powers expressly granted and (3) those essential to the accomplishment of the declared objects and purposes of municipal corporations—not simply convenient but indispensable; **Nance v. Mayflower Tavern, Inc.**, 106 Utah 517, 150 P.2d 773 (1944). Because of this rule, commonly known as Dillion's Rule, it is important that cities and counties be expressly given the power to enter into any activities that they desire to undertake. This is especially true since recreational types of programs are subject to challenge by tax payers who do not want to pay increased taxes for what they may consider unnecessary and wasteful projects.

Since it is possible that developing parkways may be best accomplished by joint or cooperative action between the city and counties in a given area, it is important to be acquainted with the Interlocal Cooperation Act. This was enacted to permit local governmental units to make the most efficient use of their powers and resources by cooperating with other local government units for their mutual advantage. The act applies to public agencies, which are defined in the act to mean any political subdivision of the state, including cities, towns, counties, school districts, and special districts of various kinds, agencies of the state or of the United States or any other state. See §11-3-3 (1) U.C.A. (1953). Section 11-13-4 of the act provides that public agencies may exercise any power or authority which it may have jointly with any other public agency having the same power or privileges. Section 11-13-5 of the act provides that any two or more public agencies may enter into agreements with one another for joint or cooperative action. Section 11-13-14 U.C.A. (1953) provides that public agencies may contract with other agencies for the performance of governmental services or activities. Section 11-13-15 provides for agreements for joint ownership, operation, or acquisition of facilities or improvements which they could acquire or operate individually. This act sets forth the procedure that must be followed in any cooperative agreement or contract and puts certain limitations on this activity. It is important to review and consider the full act when cooperative action between public agencies is considered.

Section 11-13-6 of the act provides the requirements which must be met in any agreement for joint or cooperative action. Section 11-13-9 provides that the Attorney General must approve any agreement between public agencies before it becomes effective. Section 11-13-7 U.C.A. (1953) provides that any contract between public agencies shall not extend for a term in excess of 50 years. The above references are to a few important considerations in the Interlocal Cooperation Act, and reference is again made to the complete act.

One other reference should be made to the powers of local political bodies or governmental agencies and that is that cities and towns and other such agencies can exercise powers of eminent domain in order to acquire needed lands for parkways or other recreational uses under §78-34-1 U.C.A. (1953), and the subsequent sections relating to the exercise of eminent domain.

Another matter in regard to cities, counties, and other local government agencies is they are covered by the Governmental Immunity Act which is found in Chapter 63-30 U.C.A. (1953). This act provides that, except as may otherwise be provided in the act, all governmental entities are immune from suit for any injury which may result from the activities of the government entity wherein the entity is engaged in the exercise and discharge of a governmental function. The waivers of immunity under the act are very broad and there is not a great deal of limitation of the liability of governmental agencies, but there are limitations that may be important in the development of parkways on canal properties. See §63-30-3 *et seq* U.C.A. (1953). The act provides that any claim against a political subdivision is forever barred unless notice of it is filed within 90 days from the time the cause of action arises and it provides rules to be followed in allowing or disallowing such claims and for bringing suit in courts on them. See §63-30-11 through 63-30-25 U.C.A. (1953). The act should be carefully reviewed for considerations that may be important to a project such as the development of parkways on canal properties.

An important aspect of the Governmental Immunity Act is that part which provides for purchase of liability insurance by governmental agencies including cities and counties. Section 63-20-28 and 26 of the act provide that political subdivisions may purchase insurance individually or jointly. Section 63-30-27 provides that tax may be levied for the payment of insurance premiums. Section 63-30-29 of the act provides certain requirements that contracts of insurance purchased by governmental entities must meet including minimum coverage. This coverage is \$100,000 for bodily injury or death of one person in one accident and \$300,000 for bodily injury or death of two or more persons in any one accident and \$50,000 for

injury or destruction of property. Section 63-30-34 provides that any judgment against a governmental entity which exceeds the minimum amount of liability specified in §63-30-29 can be reduced to a sum equal to such minimum requirements unless the governmental agency has secured insurance coverage in excess of said minimum requirements. This provision effectively limits the liability of governmental agencies to the minimum insurance requirements under the act so these agencies can completely protect themselves by purchasing insurance meeting the minimum requirements of §63-30-29. Section 63-3-32 of the act provides that no contract or policy of insurance may be purchased by a governmental entity or renewed except by public bid to the lowest and best bidder. The other provisions of the act relating to liability insurance should also be reviewed in considering the purchase of liability insurance.

From the above reference to laws relating to cities, counties, and other local government agencies, it can be seen that such agencies would have powers and advantages which make it more practical for them to develop parkways on canals rather than the canal companies themselves. Again, this could be accomplished by entering into an agreement with the canal companies whereby the canal companies would allow the city and/or county to develop the recreational facilities (such as the contract between the County of Maricopa, Arizona, and the Salt River Valley Water Users Association—or copy reproduced in Appendix F).

Some reference should be made to various state organizations and the role that they can or will play in the development of parkways on the canal properties. First of all, many canal companies have entered into agreements with the Division of Water Resources whereby the Division of Water Resources participates with the canal companies in the development of facilities for the storage or delivery of water. This participation is usually in the form of loans or grants to the canal companies under the provisions of Chapter 73-10 U.C.A. (1953). If any canal companies are involved in any contracts or loans with the Board of Water Resources on the canals or related projects, the board would have to approve of any agreements entered into by the canal companies for development of canal parkways and the board may even need to be made a party to the contracts.

Another state agency that would probably play a role in the development of parkways on the canals is the Division of Wildlife Resources. If fish are planted in the canal, this would probably be undertaken by the Division of Wildlife Resources, and even if it is undertaken by the city or county, such activity would be under the control and regulation of the Division and Board of Wildlife Resources. Section 23-22-1 U.C.A. (1953) provides that the Division of Wildlife Resources

shall have the power to enter into cooperative agreements and programs with other agencies of the state, municipalities, counties, corporations, and other organizations for purposes of wildlife conservation. Under this provision, the agency undertaking to develop canals as parkways would be able to enter into agreements and programs with the Division of Wildlife Resources for planting and managing fish and other wildlife on the parkways. The licensing and policing requirements involved in providing fishing on canals would also be controlled by the state through the Division of Wildlife Resources.

Development of parkways, or other recreational facilities, on the canals would also probably be subject to the laws and regulations of the Division of Health regarding health and sanitation requirements. A check should be made with the Division of Health to see what these regulations and requirements may be.

Finally, under §§63-28-6 through 68-28-10 U.C.A. (1953) cities, counties, and other political subdivisions of the state must work through the Coordinating Council of Natural Resources in order to obtain federal assistance in developing recreational facilities in the state. The Coordinating Council of Natural Resources is the agency empowered by law to act on behalf of the state and its political subdivisions in entering into contracts with the federal government for assistance in planning and developing outdoor recreational resources of the state.

Comments should also be made regarding the federal government and its agencies and any role they may play in the development of canals as parkways. First of all, it should be noted, that if any of the canal companies involved have contracts or other agreements with the federal government for the acquisition of water or for developing water storage or distribution systems, the federal government would have to approve and probably be a party to any agreement before the development of the canal involved. This was the case in the agreement between the County of Maricopa and the Salt River Valley Waters Association in Arizona (see Appendix F). All

of the civil rights and equal opportunity employment provisions of this contract are necessitated by the participation of the federal government. If the federal government becomes involved, certain environmental requirements may be incurred under federal legislation including the National Environmental Policy Act of 1969.

The federal government may be a source of financial or other assistance, but I have not researched any of the possible programs available. However, any federal assistance for the development of parkways or recreational facilities on the canal property would have to be undertaken through the Coordinating Council of Natural Resources. In any of the above circumstances, or others not mentioned, where the federal government becomes involved it is possible that the involvement by the federal government may amount to major federal actions significantly effecting the quality of the human environment which would necessitate an Environmental Impact Statement under Section 102 of the National Environmental Policy Act of 1969. The standard of major federal action significantly affecting the quality of human environment has been broadly interpreted and applied.

In general, involving the federal government in any project for developing the recreational potential of canals will greatly complicate the process, but it is likely that federal assistance that may be obtained will easily be worth additional complications.

The above ramblings and references to governmental agencies are some considerations I believe important and should be considered in undertaking to develop the recreational potential of canals and canal rights-of-way. It is possible that there may be other considerations not mentioned. The above references are brief and additional research may be needed in these areas, but this memorandum should provide background information and a basis for undertaking more exhaustive research that may be required in the future.

APPENDIX C

DETAILS OF RECREATIONAL USE SURVEY OF LOGAN AREA CANALS

W. Gast, a graduate student in Outdoor Recreation at Utah State University, began the summer 1972 use survey as soon as project funding was available. A June estimate was made in 1973 by J. Culbertson, graduate student in Landscape Architecture and Environmental Planning. With only one interviewer, sample size was limited, but each canal section was randomly sampled for about 5 percent of the hours between 9:00 a.m. and 9:00 p.m. for each month. The sample was stratified by month, weekday, weekend, and holidays. For details of sample design, see Gast (1974)

Description of Canal Sections Sampled

Five canal segments were selected throughout Logan City on three canal systems. Each had public access and visible public use. Many other sections within the city and on the suburban fringe that had canal use were not included. This is, therefore, a minimum estimate.

Canal sections sampled are illustrated in Figure C-1 and described as:

Section 1-A is the popular tubing portion of the Logan-Hyde Park-Smithfield canal. It begins where the canal is diverted from the Logan River and runs about 2 miles or more along Logan Canyon cliffs, through the golf course, and on the eastern boundary of Logan City down to 15 North Street. Only tubing was tallied on this section, which accounts for all its use until the canal reaches the golf course.

Section 1-B is an extension of the above canal section, where considerable bank use occurs (a 2,000 foot strip from 15 to 19 North streets). This canal runs through suburban Logan and is used as a community park. Parts of this section were heavily used by the "active-use neighborhood."

Section 2-A is a 2,600 foot length of the Logan Northern in the Logan island area. It extends from a point north of the intersection of Lauralin Drive and Canyon Road west to the intersection of 6 East and 4 North Streets. A trail runs along the canal and it is well shaded.

Section 2-B is a further portion of 2-A as the canal goes through the northern suburban part of Logan before entering rural lands of the country. It is an 1,800 foot strip between 10 North and 8 East Streets, has a good canal bank trail, and is partially shaded.

Section 3-A is in the island area of the city on the Logan North Field canal. It runs about 2,100 feet from the bridge on 5 East and Canyon Road to Center Street. There is a path along about half its length, and it is heavily shaded with large trees.

Total Canal Recreational Use

Recreational use of canals by month was:

Month	Number of Users	Percent
June 1973	2,048	12
July 1972	7,070	43
August 1972	7,535	45
Total	16,653	100

Month	Number Hours	Percent
June 1973	2,197	10
July 1972	9,800	45
August 1972	9,903	45
Total	29,900	100

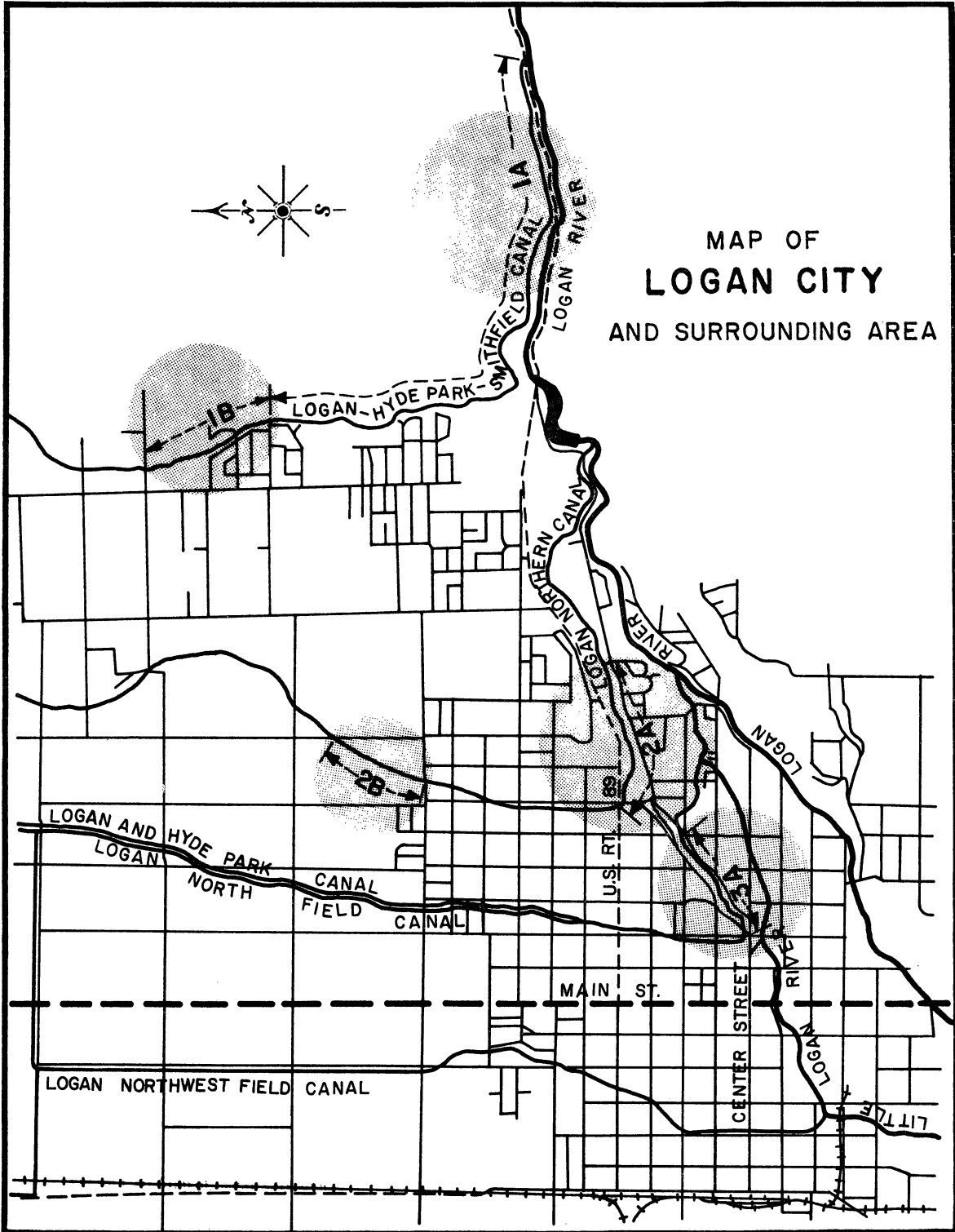


Figure C-1. Map of Logan City area.

Use is heaviest in July and August but the low June use is felt to be abnormal. June 1973 was cool and wet; during one sampling day there was intermittent snow, on others it rained. Table C-1 presents types of recreational use by canal section. Notice that data are in sample totals and not expanded for total summer use. Also Section 1-B, due to its low use, was not

broken down into type of activity. This table illustrates the diversity in amount and type of canal use between sections. Although tubing is popular in all sections, it only dominates use in Section 1-A and 1-B. Bank play dominates in Section 2-B and fishing in Section 3-A (this latter section was also Section 2 in the fish stocking survey).

Table C-1 Summer recreational use estimates by type for each canal section (sample totals).

Type of Activity	Recreational Use by Canal Sections							
	Sec. 1A Hrs.	Per-cent	Sec. 1B Hrs.	Per-cent	Sec. 2B Hrs.	Per-cent	Sec. 3A Hrs.	Per-cent
Tubing	565.2	100	73.3	41	16.9	19	5.8	16
Play	0	--	55.0	31	40.2	46	8.8	25
Walking	0	--	7.9	4	21.4	25	3.4	9
Bicycling	0	--	32.9	18	3.2	4	3.4	9
Fishing	0	--	0	--	0	--	11.4	32
Misc. ^a	0	--	10.5	6	5.3	6	3.3	9
Totals	565.2	100	179.6	100	87.0	100	36.1	100

^aMiscellaneous includes activities like jogging, sitting along in a lawn chair, reading, etc.

APPENDIX D

SURVEY OF TWO CANAL NEIGHBORHOODS

Methods used to conduct this survey were as follows: All households in the neighborhood were numbered and the sample randomly drawn "out of the hat." An interviewer (Donald Wood, graduate student at Utah State University) then approached each sample household and established the number, age, and sex of each member. A chart was left for each member to estimate their summer 1973 canal use and both heads of households were given an attitude questionnaire. The attitude questionnaire was collected 1-3 weeks later and use charts were returned in the fall.

The survey was not designed to collect general city-wide use or attitudes, but to contrast two neighborhoods with easily accessible canals and apparent differences in use styles. Results illustrate a wider divergence in use and attitudes than suspected.

Although not indicating general city attitudes, we feel the samples represent their respective neighborhood use and feelings about canals. The questionnaire is reproduced here to serve as a starting point for anyone designing a similar one for the future. If used for a large sample, where non-response might be a problem, this questionnaire should be shortened. There are also several questions that would benefit from a rewrite.

Summary of Results

Questions A, B, and D have been discussed previously. Most adults responded to question C by suggesting canal banks be clean, cut and groomed, and trail facilities improved. There were mixed opinions about ownership and liability (question E and F).

The 46 questions in section G are of several categories:

1. Canals effect on market value of home (questions 1, 6, 10 and 16).
2. How canal affects neighborhood setting or beauty (questions 2, 3, 5, 7, 9, 14, 15, 17, and 18).
3. Who owns the canal, attitude toward canal bank, landowners and liability problems (questions 22, 23, 26, 27, 31, 32, 34, 37 and 40).
4. Safety and liability perception (questions 4, 8, 11, 12, 13, 19, 20, 24, and 28).
5. Future possibilities for canals (questions 21, 25, 29, 30, 33, 35, 36, 38, 39, 41, 42, 43, 44, 45, 46).

These questions and responses are reproduced below. Each question has 55 potential responses from both neighborhoods. If responses total less than 55 there were some that left that question blank.

Husband _____
 Wife _____

Number _____

CANAL NEIGHBORHOOD QUESTIONNAIRE

A. Please list some of the good things or the things you like about having a canal in your neighborhood. If you can't think of any good things write "None."

() _____
 () _____
 () _____

Now, put a number one (1) in front of the most important good thing, and a number two (2) in front of the second most important thing.

B. Now list some of the bad things or the things you don't like about having a canal in your neighborhood. If you can't think of any bad things write "None."

() _____
 () _____
 () _____

Put a number one (1) in front of the most important bad thing, and a number two (2) in front of the second most important bad thing.

C. What things would you like to see done to improve the canal in terms of appearance, safety, or recreational use.

D. Thinking of all the advantages and disadvantages of the canal, is it:
 _____ An asset to your neighborhood?
 _____ A liability to your neighborhood?
 _____ Neutral in its affect on your neighborhood?

E. Who do you think owns the canal banks in your neighborhood?
 _____ Logan City, _____ Canal Company, _____ Adjacent landowners,
 _____ Don't know.

F. Could anyone be sued if a child fell into the canal and drowned?
 _____ Yes _____ No _____ Don't know. If so, who do you think is responsible?

G. Following is a list of statements made by people living near canals. Please indicate whether you agree or not by placing a check mark in the space which best describes your feelings. Feel free to write in comments if you wish to explain your answers

	Strongly Agree	Agree	Disagree	Strongly Disagree	No Opinion
Active.	(Passive)	A (P)	A (P)	A (P)	A (P)

1. The canal was one reason we decided to live in this neighborhood. 2 (4) * 6 (0) 13(11) 5 (0) 10(3)

* Figures in front of parentheses show responses from active use neighborhood. The responses from passive use neighborhood are shown in parentheses.

	<u>Strongly Agree</u>		<u>Agree</u>		<u>Disagree</u>		<u>Strongly Disagree</u>		<u>No Opinion</u>	
	A	(P)	A	(P)	A	(P)	A	(P)	A	(P)
2. The canal provides a link with nature not often found in the city.	18	(5)	14	(8)	2	(3)	1	(1)	2	(1)
3. The canal seems to cool our yard during the summer.	1	(3)	2	(3)	16	(6)	3	(2)	15	(4)
4. We worry about flooding or leakage from the canal damaging our property.	0	(2)	1	(2)	21	(11)	10	(1)	5	(2)
5. We enjoy watching the birds and wildlife around our neighborhood.	26	(6)	7	(8)	1	(3)	1	(0)	2	(1)
6. We had to pay more for our home because of the canal.	1	(0)	3	(0)	21	(9)	5	(3)	6	(6)
7. The canal environment makes living here more enjoyable.	15	(5)	10	(2)	5	(5)	1	(1)	6	(5)
8. Small children often play around the canal with little or no supervision.	4	(4)	8	(11)	16	(2)	1	(0)	7	(1)
9. The canal makes our home and yard more beautiful	3	(5)	1	(3)	14	(7)	5	(1)	12	(2)
10. If the canal weren't here our home would be worth less money.	1	(1)	3	(0)	18	(12)	6	(2)	9	(3)
11. We often worry that children will drown or be injured while playing around the canal.	5	(3)	8	(11)	19	(3)	2	(0)	3	(1)
12. Mosquitoes and other pests coming from the canal are a neighborhood problem.	1	(1)	7	(6)	20	(7)	6	(2)	3	(2)

	<u>Strongly</u> <u>Agree</u> A(P)	<u>Agree</u> A(P)	<u>Disagree</u> A(P)	<u>Strongly</u> <u>Disagree</u> A(P)	<u>No</u> <u>Opinion</u> A(P)
13. Our younger children are not allowed to go near the canal without supervision (7 years or younger)	10(6)	8(5)	2(0)	0(1)	16(6)
14. The canal improves the general appearance of our neighborhood	10(4)	13(5)	10(4)	2(3)	2(2)
15. The canal is more important to our family for active use such as hiking or tubing than for its appearance.	5(0)	20(1)	6(10)	0(1)	5(6)
16. Our home will be easier to sell because of the canal.	1(0)	8(2)	13(10)	6(1)	9(5)
17. The canal environment attracts birds and other wildlife to the neighborhood.	12(4)	20(7)	3(5)	0(1)	2(1)
18. The canal is valuable as a play area for neighborhood children	9(1)	20(10)	6(4)	0(3)	2(0)
19. Litter along and in the canal is a problem.	2(7)	16(6)	14(4)	2(0)	2(1)
20. People using the canal for recreation often bother us.	0(0)	4(0)	20(12)	10(0)	3(6)
21. We would enjoy the canal more if the city kept a good dirt trail open along the bank.	6(0)	14(3)	12(5)	1(3)	3(7)
22. Liability for injury or death along the canal should be assumed by the city.	0(1)	2(0)	16(6)	5(3)	14(8)
23. The canal is public property and open to anyone who wants to use it.	1(1)	16(7)	11(6)	2(1)	6(3)

	<u>Strongly</u> <u>Agree</u> A(P)	<u>Agree</u> A(P)	<u>Disagree</u> A(P)	<u>Strongly</u> <u>Disagree</u> A(P)	<u>No</u> <u>Opinion</u> A(P)
24. People from outside the neighborhood tubing or hiking along the canal are a constant threat to the property of people in the neighborhood.	1(1)	7(2)	20(12)	6(0)	1(4)
25. Someone should do something to improve safety along the canal.	2(3)	15(5)	11(5)	0(0)	8(5)
26. Members of my family, while playing along the canal, have been treated rudely by people living along the canal.	0(0)	4(1)	20(10)	7(0)	5(7)
27. Most people living along the canal act as though it were their property.	1(0)	1(5)	20(5)	2(0)	11(8)
28. The canal is ugly at times.	1(3)	11(9)	15(2)	7(1)	3(3)
29. Trout should be stocked in the canal for the children to catch.	2(0)	10(5)	12(8)	2(5)	10(0)
30. The city should do something to enhance recreation and eliminate hazards along the canal.	5(1)	20(8)	6(2)	1(2)	5(5)
31. The canal company doesn't seem to object to canal recreational use.	1(0)	22(13)	4(0)	1(0)	9(5)
32. The canal company should be reimbursed by the public for damages and maintenance problems caused by recreationists.	2(0)	16(4)	10(9)	0(0)	9(5)
33. It would bother us if the canal were lined with concrete.	6(1)	13(1)	10(14)	1(0)	6(2)

	<u>Strongly</u> <u>Agree</u> A(P)	<u>Agree</u> A(P)	<u>Disagree</u> A(P)	<u>Strongly</u> <u>Disagree</u> A(P)	<u>No</u> <u>Opinion</u> A(P)
34. The company that operates the canal has the right to keep recreationists out if it wants to.	2(1)	17(7)	9(4)	1(1)	8(5)
35. The canal should be enclosed with a six foot chain-link fence to protect children.	2(0)	4(3)	14(3)	15(2)	2(0)
36. We would object if the canal were run underground through a pipe.	15(0)	5(7)	6(5)	7(4)	4(2)
37. A landowner, bothered by people playing in the canal adjacent to his home, has the right to ask them to leave.	5(1)	9(14)	16(1)	3(0)	4(2)
38. Small parks should be developed on open space along the canal.	8(0)	12(2)	9(8)	1(1)	4(7)
39. Modifying the canal to enhance its recreational potential would give local citizens a much needed source of convenient recreation.	9(0)	17(7)	7(5)	1(2)	3(4)
40. A private landowner adjacent to the canal has the right to fence off the canal bank to public access.	0(0)	4(3)	13(6)	14(0)	5(9)
41. Motorcycles should be banned from the canal bank.	14(6)	14(7)	3(3)	0(0)	1(2)
42. We would be bothered if the number of people using the canal for recreation increased.	1(3)	11(8)	16(6)	3(0)	5(1)

	<u>Strongly</u> <u>Agree</u> a(P)	<u>Agree</u> A(P)	<u>Disagree</u> A(P)	<u>Strongly</u> <u>Disagree</u> A(P)	<u>No</u> <u>Opinion</u> A(P)
43. Better public access is needed for canal recreationists.	2(1)	16(1)	13(7)C	2(2)	4(7)
44. We would actively oppose any plan to alter the canal for the purpose of increasing public recreational use.	4(3)	9(5)	17(7)	3(0)	4(3)
45. A paved bicycle path should be built along the canal.	2(0)	9(4)	10(8)	8(4)	8(2)
46. The canal bank would be a good place for horseback riding and should be developed to accommodate horses.	0(0)	10(2)	10(5)	10(9)	7(2)

APPENDIX E

RESEARCH DESIGN AND ESTIMATES OF TROUT POPULATIONS IN SECTIONS OF NORTH FIELD CANAL, LOGAN, UTAH: AUGUST 1972 AND 1973

Since other canals of Cache Valley are drained in winter, only the Logan Island area of the Logan Northfield canal was sampled. Until winter 1972 this canal maintained a full stream of water throughout the year. Three sections of this canal were selected to display various habitat conditions. They are illustrated in Figure 15, and described as:

Section 1. A slow, deep 650 foot section located from Canyon Road Bridge upstream to bridge on 2nd North Street. This area was characterized by relatively slow current (1 to 1½ ft/sec) deep water (3½ to 4½ ft), abundant rooted aquatic plants comprising 90 percent of the bottom (primarily *Ranunculus circinatus*) and sparse overhanging bank vegetation.

Section 2. A 700 foot canal section as it paralleled Canyon Road between 3rd and 4th East streets. This area was characterized by moderate current (2 to 2½ ft/sec), depths of 2½ to 3½ ft, scattered beds of rooted aquatic plants on 10 percent of bottom and sparse overhanging bank cover. Approximately 200 feet of this section had a cement bank on one side.

Section 3. A 600 foot section commencing 120 feet downstream from Preston Avenue Bridge and terminating upstream at the canal diversion station on the North Fork of Logan River. This area had a relatively fast current (3-4 ft/sec), depths of 1½ to 2½ feet, no rooted aquatic plants, but abundant overhanging bank cover of trees and shrubs.

Methods

Each canal section was electro-shocked in August 1972 (previous to a prolonged drainage) and in August 1973 (after drainage from November 1972 to May 1973). A three-man crew stunned, netted, marked (by

fin clipping), measured and weighed all fish 6 inches or larger. A 230 volt A.C. generator system, with two electrodes on 100 foot cords was used. Work was supervised by Dr. Paul Holden, Fisheries Management at Utah State University.

The Peterson mark-recapture method was employed to calculate population (Equation 1), 95 percent confidence intervals were calculated as twice the standard error (Equation 2):

$$\text{Equation 1: } N = \frac{mc}{r}$$

$$\text{Equation 2: } SE = N \frac{(N - m)}{mc} \frac{(N - C)}{(N - 1)}$$

N	=	estimated population
m	=	total marked in population
c	=	total captured in second sample
r	=	number marked fish recaptured in second sample

Notice that this method requires each section be shocked twice to obtain a population estimate; three to five days normally separated first and second shockings.

Results

Our population estimates show fish in the 8-12 inch range as most common, with brown trout (*Salmo trutta*) by far the most abundant species. The largest brown trout collected was in Section 1 during August 1972; it was 18 inches long and weighed approximately 2 pounds. Two rainbow trout (*Salmo gairdneri*) of 11 and 9 inches were also collected in Section 1 that summer. This species of trout was rare and none was collected elsewhere. Section 3 produced one mountain white fish (*Prosopium williamsoni*) 13 inches in 1972; this species was equally rare.

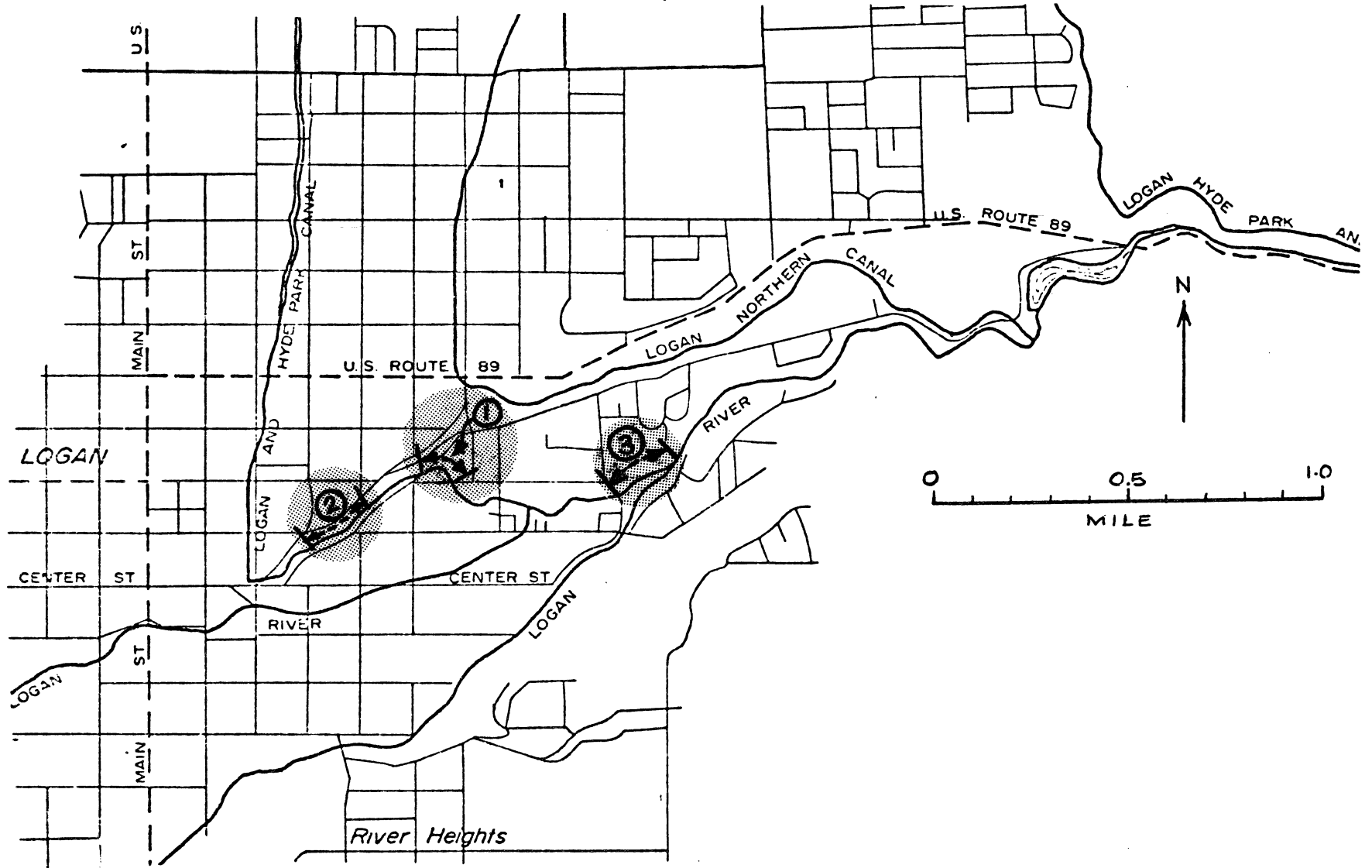


Figure E-1. Map of Logan City and surrounding area.

Table E-1 gives numbers of brown trout by size class for August 1972; due to smaller populations in August 1973 not enough fish were collected to make estimates by size class.

Comparative data between August 1972 and 1973 were offered in Table E-2. Illustrated are population estimates of brown trout by section for both summers at 95 percent confidence intervals; the heavy mortality resulting from the winter 1972-73 drainage is evident. Most fish shocked in August 1973 had probably entered the canal since its filling the previous April. The statistical problems of small fish populations sampled in August 1973 are again illustrated in the large confidence intervals. Due to these reliability problems, no populations per mile of stream estimate were made in 1973.

The August 1972 brown trout population was thought to be stable and near the canal carrying capacity. August 1973 trout populations were too small for detailed analysis, so only the 1972 population is analyzed further.

Discussion of August 1972 Sample

A rather obvious correlation between bank-bottom cover and fish numbers was evident in August 1972. Section 1 had abundant cover of rooted macrophytes and Section 3 had vegetative bank cover and both had much larger populations than the relatively open Section 2. This is typical for brown trout streams of similar size. Also, scarcity of rainbow trout in the canal is characteristic of good brown trout streams, not regularly stocked with rainbows.

Table E-1. Fish population estimates from three sections of Logan island area of Logan Northfield Canal (August 1972).

Canal Section	Size Classes (inches)					Total Number of fish	Confidence Interval (95% level)
	6.0-8.0	8.1-10.0	10.1-12.0	12.1-14.0	14.1+		
1	54	78	98	62	0	279	334 224
2	63	22	40	9	4	126	148 104
3	— ^a	—	—	—	—	297	371 223

^aSize class estimates not taken due to weather and manpower problems.

Table E-2. Brown trout population estimates on Logan island area of Logan Northfield Canal (August 1972 and 1973).

	Section 1		Section 2		Section 3	
	Number per section ^a	Per mile estimate ^b	Number per section	Per mile estimate	Number per section	Per mile estimate
August 1972	279±55	2,232	126±22	915	297±74	2,614
August 1973	21±12	—	30±50	—	24±18	—
% Change	-92%	—	-76%	—	-92%	—

^aNumber of brown trout 6 inches or larger at 95 percent confidence interval.

^bNumber per section expanded to a number of brown trout/mile for similar stream conditions. Per mile estimate not made in August 1973 due to statistical problems of low population samples.

The population estimate of Section 3 is questionable, the other two quite good. Section 3 was believed a poor estimate because fish collected during the second sampling, although not measured, were definitely of smaller size than those of the first sample. Similar sizes of fish were caught in the other two sections both trials. Total numbers of fish collected in Section 3 suggests the population is lower than Section 1, perhaps the lower confidence interval is a more realistic estimate. The reasons for apparently different populations in Section 3 for the two samplings is unknown. Perhaps varying flows into the canal from the Logan River caused movement of fish into the study area.

Regardless of the accuracy of Section 3 estimate, brown trout are indeed extremely abundant in this canal. On a per mile basis, Section 1 has 2232 brown trout 6 inches or more in length per mile. Section 2, 915/mile and Section 3, 2614/mile (lower estimate 1962/mile). These values especially Sections 1 and 3, compare very favorably with the Blacksmith Fork River where Gosse (unpublished data) found 1206 trout/mile, and are much higher than 342 trout/mile found in a study of the Logan River (Bridges 1963). Both of these examples were estimated with methods and equations similar to those used here and both

counted only 6 inch or longer trout. Therefore, the canal studied was as good or better than two larger rivers for catchable sized brown trout. Both the Logan and Blacksmith Fork Rivers are considered good to excellent brown trout streams for this region.

The August 1972 data showed that larger size classes seemed to dominate the canal, where usually smaller fish are much more abundant in most wild populations. It is doubtful this was a fluke caused by biased sampling gear, as fish 4 inches and greater are quite vulnerable to such equipment, especially in areas similar to Sections 2 and 3. Smaller fish, young-of-the-year, are often hard to collect because they are usually concealed in cover and when shocked become trapped, never becoming visible. Several young-of-the-year were collected, but their population was not estimated since it was doubtful their numbers were adequately sampled. Therefore, domination of the study area by larger fish is probably a valid population profile. The reason for this older population is probably low mortality or underfishing. Removal of the larger trout at a faster rate than at present could shift the size structure of the population down somewhat and at the same time probably increase the numbers present.

APPENDIX F

EXAMPLE OF COOPERATIVE RECREATIONAL USE AGREEMENT BETWEEN THE COUNTY OF MARICOPA, ARIZONA, AND THE SALT RIVER VALLEY WATER USERS' ASSOCIATION

Permit and Agreement Relating to Use of Salt River Project Rights-of-Way for Public Recreational Activities

1. THIS AGREEMENT, made this 5th day of November, 1964, between the COUNTY OF MARICOPA, State of Arizona, hereinafter referred to as "Permittee", and the SALT RIVER VALLEY WATER USERS' ASSOCIATION, a corporation organized and existing under the laws of the State of Arizona, having its principal place of business at Phoenix, Arizona, hereinafter referred to as "Association";

WITNESSETH:

2. WHEREAS, under that certain agreement entitled "agreement between the United States of America and Salt River Valley Water Users' Association Relating to Use of Rights-of-Way for Public Recreational Activities" bearing Contract No. 14-06-300-1489, and dated November 5, 1964, the United States of America, hereinafter referred to as "United States", has authorized the Association to issue permits for the use for public recreational activities of certain rights-of-way of the Salt River Project (hereinafter referred to as the Project) administered by the Association subject to the terms and conditions of the said agreement; and

3. WHEREAS, the Permittee desires to establish and maintain recreational facilities on the rights-of-way hereinafter described; and

4. WHEREAS, it has been determined by the Association that the maintenance of public recreational facilities on said rights-of-way by the Permittee subject to the terms and conditions hereinafter set forth will not be incompatible with interests of the United States or of the Association in said rights-of-way or with the purpose for which said rights-of-way are administered;

5. NOW, THEREFORE, in consideration of the mutual covenants herein contained, the parties hereto agree as follows:

6. Subject to the terms and conditions hereinafter set forth, the Association does hereby authorize and permit the Permittee to enter upon the right-of-way area hereinafter styled "permit area," as shown on Drawing No. A-31-46, dated January 1963, a copy of which is attached hereto and by reference made a part hereof, and more particularly described as follows:

The right-of-way of the Arizona Canal from Granite Reef diversion dam in Section 13, Township 2 North, Range 6 East to its termination at Skunk Creek in Section 2, Township 3 North, Range 1 East (route shown in blue on enclosed Map No. A-31-46);

ALSO:

The right-of-way of the South Canal from Granite Reef diversion dam to the South Consolidated Power House located in Section 31, Township 2 North, Range 6 East (route shown in green on said map);

ALSO:

The right-of-way of the Consolidated Canal from said Consolidated Power House to its intersection with the Western Canal at approximately the East Quarter Corner of Section 7, Township 1 South, Range 6 East (route shown in yellow on said map);

ALSO:

The right-of-way of the Western Canal from said East Quarter Corner to the Kyrene steam Plant in Section 10, Township 1 South, Range 4 East (route shown in orange on said map);

ALSO:

The right-of-way of the Highline pipeline from the Kyrene Steam Plant to its termination at the North Branch of the Highline Canal in Section 9, Township 1 South, Range 4 East, from aforementioned point to the North Branch of the Highland Canal to Guadalupe Road (route shown red on said map);

for the sole purpose of establishing and maintaining for the use of the public for public recreational purpose, i.e., hiking, horseback riding, picnicking, bicycling, and other recreational activities.

7. This permit shall at all times be subject to existing rights in favor of third persons and subjects and subordinate to the rights of the United States of America, its successors or assigns, and the Association and their respective officers, employees, contractors and agents to remove construction materials from the permit area and to construct, reconstruct, install, repair, replace, operate and maintain canals, laterals, ditches, electric transmission lines, telephone and telegraph lines and/or any other structures or works of any kind of nature within or in the vicinity of the permit area without liability for damage to any works, facilities or equipment of the Permittee and without any liability for Permittee's inability to establish and/or maintain the facilities contemplated by this permit as a result of such construction, reconstruction, installation, repair, replacement, operation or maintenance of such works. There is also expected and reserved the right to prospect and carry on developments for oil, gas, coal and other minerals on any lands of the United States described herein.

8. This permit shall become effective upon the endorsement thereon of the approval of the Regional Director, Region 3, Bureau of Reclamation, hereinafter referred to as Regional Director, and shall terminate on November 5, 2014 unless sooner terminated as provided in Article 12 hereof.

9. In the use of the permit area, the Permittee shall faithfully comply with the following provisions and each of them;

- (a) No structures or works of any kind shall be constructed or erected so as to interfere with the operation and maintenance of any works of the Project, and no structures or works of any kind shall be constructed or erected without the written approval of the Association based upon drawings illustrating plans for such facilities submitted in advance to the Association by the Permittee.

- (b) Permittee shall not permit and by providing adequate police or other supervision shall prevent the use of the permit area for any purpose or in any manner prohibited under the terms of this permit or not authorized thereunder.
- (c) Permittee shall maintain the permit area in a safe, sanitary and sightly condition and shall prohibit and prevent the disposal of garbage, rubbish, trash or other refuse and shall prohibit and prevent such disposal on adjacent areas by persons using the permit area.
- (d) Permittee shall erect and maintain adequate fencing as required by the Association, for the purpose of restricting the public from those parts of the permit area which by reason of proximity to works of the Project or for any other reason are hazardous to persons entering thereon or the use of which by the public would endanger or interfere with the operation and maintenance of the Project.
- (e) Permittee shall not permit the use of maintenance roads of the Project located within the permit area for the operation by the public of motor driven vehicles of any kind, or for any other purpose not specifically authorized herein.
- (f) To the extent legally permissible, Permittee shall indemnify and hold harmless the United States and the Association and their respective officers, agents and employees from any and all claims for injuries to persons or damage to property arising out of the permit area by the public or by the Permittee. In addition, Permittee shall at all times during the term of this permit and the extension thereof carry public liability insurance in favor of the United States, its successors or assigns, and the Association and their respective officers and employees, under a policy or policies of insurance approved in writing by the Association and by the Regional Director as to form, limits of liability, and insurer.
- (g) The Permittee shall not use or permit the use of the permit area for any purpose other than those described in Article 6 herein.
- (h) During the term of this permit or any extension thereof, Permittee agrees to furnish to the Regional Director, upon request, such information as to current and proposed use of the permit area as may be needed for report purposes.

10. The Permittee hereby releases and relinquishes any and all claims which it may at any time have or claim to have against the United States, its successor or assigns, the Association, and their respective officers, agents and employees, or any one or more of them, on account of damage to any of the equipment, facilities or works of the Permittee arising out of the exercise of any of the rights set out in Article 7 hereof, or by any cause whatsoever.

11. Neither this permit nor any interest therein shall be transferred or assigned by the Permittee without the written approval of the Association and of the Regional Director, and any such attempted transfer or assignment without such written approval shall be a nullity.

12. This permit shall terminate and all rights of Permittee hereunder shall cease:

- (a) At the expiration of the term or the extension thereof as provided by Article 8 hereof.
- (b) After default of the Permittee in compliance with any of the provisions of this permit and on the 90th day following service on the Permittee by the Association of written notice of termination because of such default.
- (c) Upon three (3) months written notice served on the permittee by the Association or by the Regional Director that it has been determined that continuation of the within permit would not be compatible with the interests of the United States or with the purposes for which Project rights-of-way are administered.
- (d) In the event of termination of the Agreement between the United States and the Association referred to in Article 2 hereof, upon three (3) months' written notice served on the Permittee by the Regional Director that the United States had determined, pursuant to the proviso of Article 9 of said Agreement, that the within permit is not to continue in force and effect.
- (e) Without cause, upon three (3) months' written notice served on the Association and the Regional Director by the Permittee.

Upon the termination of this permit as herein provided, the Permittee shall at its cost and expense remove all equipment, facilities, structures and works placed on the permit area by Permittee or under the authority of Permittee and restore the permit area to a like condition as when taken, reasonable wear and damage by the elements excepted; provided, that if

Permittee fails to remove such structures, facilities and works or any of them within sixty (60) days after the termination of this permit, such structures, facilities or works shall become the property of the United States or at the option of the United States, may be caused to be removed by the United States or the Association at the expense of the Permittee and Permittee shall promptly pay such expense upon billing therefor.

13. It is understood and agreed by the parties hereto that no representation is made herein by the Association as to the nature of the estate or interest of the United States or the Association in the lands within the permit area.

14. The within permit and all rights of the Permittee thereunder shall be subject to and controlled by the provisions of the Agreement between the United States and the Association referred to in Article 2 hereof.

15. (a) Definitions: As used in subsections (b), (c), and (d) herein: (1) The term "Lessee" shall mean the Permittee and Permittee's employees, agents, lessees, sublessees, and contractors, and the successors in interest of the Lessee; (2) the term "facility" shall mean any and all services, facilities, privileges, accommodations, and activities available to the general public and permitted by this agreement.

(b) The Lessee shall not: (1) publicize any facility operated hereunder in any manner that would directly or inferentially reflect upon or question the acceptability of any person because of race, creed, color, ancestry, or national origin; (2) discriminate by segregation or other means against any person because of race, creed, color, ancestry, or national origin in furnishing or refusing to furnish such person the use of any such facility.

(c) The Lessee shall post the following notice in such a manner where any facility is available so as to insure that its contents will be conspicuous to any person seeking employment or use of any facility. Such notice shall be furnished the Lessee by the Secretary.

NOTICE

THIS IS A FACILITY OPERATED IN AN AREA UNDER THE JURISDICTION OF THE UNITED STATES DEPARTMENT OF THE INTERIOR.

NO DISCRIMINATION BY SEGREGATION OR OTHER MEANS IN THE FURNISHING OF ACCOMMODATIONS, FACILITIES,

SERVICES, OR PRIVILEGES ON THE BASIS OF RACE, CREED, COLOR, ANCESTRY, OR NATIONAL ORIGIN IS PERMITTED IN THE USE OF THIS FACILITY. COMPLAINTS OF VIOLATIONS OF THIS PROHIBITION SHOULD BE ADDRESSED TO THE SECRETARY OF THE INTERIOR, WASHINGTON, D.C., 20240.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

(d) The Lessee shall require in all of Lessee's contracts or other forms of agreement for the operation of a facility pursuant to this agreement inclusion and compliance with provisions identical with those stated in subsection (a), (b), (c), and (d) herein.

(e) During the performance of this contract the Permittee hereinafter referred to as the contractor, agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The contractor will take affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order No. 10925 of March 6, 1961, as amended, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

(5) The contractor will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, as amended, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 10925 of March 6, 1961, as amended, and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(7) The contractor will include the Provisions or paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee of Equal Employment Opportunity issued pursuant to Section 303 of Executive Order No. 10925 of March 6, 1961, as amended, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: **Provided, however,** that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

Inclusion of the above nondiscrimination clause in subcontracts may be by reference to Section 301 of the Executive Order 10925, dated March 6, 1961, as amended. Subcontracts below the third tier, other than subcontracts calling for construction work at the site of construction, are exempt from the requirements of the clause.

16. The provision of this permit shall, to the extent applicable, apply to any concessioners of the Permittee conducting business of any kind or nature upon the permit area.

17. The provisions of this permit shall apply to and bind the successors and assigns of the Association and the successors and assigns of the Permittee.

18. (a) Any notice, demand or request required or authorized by this agreement to be given or made to or upon the United States shall be deemed properly given or made if delivered, or mailed postage prepaid, to regional Director, Region 3, Bureau of Reclamation, Boulder City, Nevada.

(b) Any notice, demand or request required or authorized by this agreement to be given or made to or upon the Permittee shall be deemed properly given or made if delivered, or mailed postage prepaid, to the Permittee at the address at the foot of this permit.

(c) Any notice, demand or request required or authorized by this agreement to be given or made to or upon the Association shall be deemed properly given or made if delivered, or mailed postage prepaid, to the Association at the address at the foot of this permit.

(d) The designation of the person to or upon whom any notice, demand or request is to be given or made, or the address of any such person, may be changed at any time by notice given in the same manner as provided in this article for other notices.

19. Nothing contained herein shall be construed to prohibit the Association or the Permittee from requesting the advice of the National Park Service in the planning and construction of recreational facilities in accordance with this permit.

IN WITNESS WHEREOF: the parties hereto have caused this permit to be executed the day and year first above written.

MARICOPA COUNTY BOARD OF SUPERVISORS
by /s/ Ruth A. O'Neil, Chairman
Address: 3325 West Durango, Phoenix

MARICOPA COUNTY EXECUTIVE PARK
COMMITTEE

by /s/ Fred M. Guirey, Chairman
Address: 622 West Tamarisk, Phoenix

SALT RIVER VALLEY WATER USERS'
ASSOCIATION

by /s/ Victor I. Corbell, President
Address: P. O. Box 1980, Phoenix

ATTEST:

/s/ A. L. Monette, Secretary

Approved this 18th day of November, 1964

THE UNITED STATES OF AMERICA

by /s/ R. S. Welsh
Acting Regional Director
Region 3
Bureau of Reclamation
Boulder City, Nevada