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A DESCRIPTION OF TIMPIE SPRINGS, UTAH, WITH A PRELIMINARY SURVEY OF THE AQUATIC MACROBIOTA

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ABSTRACT.— A description of some physical, chemical, and biotic features of Timpie Springs, Utah.

Timpie Springs, Tooele County, Utah, is a spring, pond, marsh complex (Fig. 1) in the southeastern corner of the intersection of Interstate 80 and the Skull Valley Road (Utah Highway 40), Sections 8 and 9, Range 7 W, Township 1S.

This aquatic complex is at an altitude of 1300 m at the northwestern base of the Stansbury Mountains. With the exception of the spring and related mesic habitat, the surrounding area is a typical, xeric, cold-shrub Great Basin sit. Greasewood (*Sarcobatus vermiculatus*), samphire (*Salicornia* sp.), and goat grass (*Aegilops cylindrica*) are the dominant riparian vegetational species.

Present human use of the area includes cattle watering and grazing, fishing, hunting, water withdrawal for road and other construction projects, and water for the impoundments of the adjacent Timpie Wildlife Management Unit.

Human modifications of the area include a galvanized steel flume in the channel connecting the pond with the marsh, a levee separating the marsh from the pond, and a double culvert draining the marsh waters under Interstate 80 into the Timpie Wildlife Management Unit. A well-graded gravel road leads from the Skull Valley Road west to the spring where it joins another well-graded gravel road that follows the foot of the Stansbury Mountain Range in a roughly north-south direction.

Timpie Springs lies at the extreme northwestern tip of the north-south-trending Stansbury Mountain Range, the northern portion of which is characterized as the Garden City

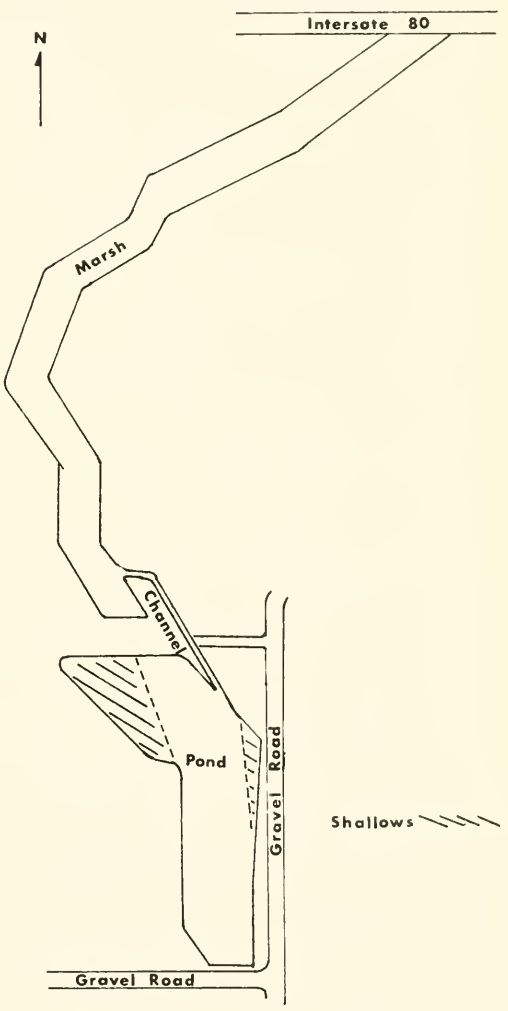

Fig. 1. Schematic of Timpie Springs, Tooele Co., Utah.

[1]1020 Custer Avenue, Ogden, Utah 84404.
[2]3765 Harrison Boulevard, Ogden, Utah 84403.

Formation (Rigby 1958). The spring issues from the easternmost of a series of faults in the Stansbury Range (Everett 1957). According to Everett (1957) all groundwater in Skull Valley is produced from deposits of lake clays, silts, and gravels intermixed with alluvial deposits. Everett (1957) divides the groundwaters of the valley into a northern saline reservoir and a southern freshwater reservoir. Timpie Springs, originating in the northern reservoir, is estimated to contribute 20,000 tons of salt (total salt in solution) annually to the Great Salt Lake (Eardley 1957).

Materials and Methods

Water chemistry values were measured on three occasions at three points in the system: Point A = spring effluent, B = channel, and C = marsh. Chemical constituents were measured by the Hach[3] drop count method and converted to mg/l, where applicable. Temperature was measured with a Weston thermometer (Model 2265).

Fish were captured with long-handled dipnets from within six feet of the banks of the pond and marsh and throughout the length of the channel. The presence or absence and relative abundance of each species was noted.

Aquatic macroinvertebrates were sampled nonquantitatively along the banks of the pond and marsh and throughout the channel. The presence or absence and relative abundance of a species was noted.

Aquatic macroflora was sampled nonquantitatively along the banks of the pond and marsh and throughout the channel. The presence or absence and relative abundance was noted.

Results

POND.— Dabb (1977, 1980) reports the mean depth of the Timpie Springs pond as 5 ft. Our measurements give a surface area of 117,500 ft^2 for the pond. To reach an estimate of total volume, however, it appeared necessary to apply the 5 ft depth only to the main body of the pond. Inclusion of the two main areas of shallows (Fig. 1) gives an inflated figure for volume. The shallow areas account for 34,500 ft^2 of surface area but, at an average depth of one foot, only 34,500 ft^3 of volume. This leaves a surface area of 83,000 ft^2 for the main body of the pond or a volume for the main body of 415,000 ft^3, bringing the total pond volume to 449,500 ft^3. The pond substrate consists mostly of a deep deposit of silt and sand.

CHANNEL.— Discharge from the pond into the channel is 4.6 cfs. Discharge (Q) was calculated by the method described by Reid and Cox (1976):

$$Q(cfs) = WD_mV_m$$

where Q = discharge (cfs)
D_m = mean channel depth
W = width (ft)
V_m = mean velocity (ft/sec)

[3]Hach Chemical Company, Loveland, Colorado.

TABLE 1. Temperature and chemical constituents, Timpie Springs, Tooele Co., Utah.

Site and date in October 1981	Temperature (C)	pH	TH[1]	TA[2]	Ca	Mg	Cl	DO[3]
			mg/l					
A. 3	18.0	7.5	721.5	189.0	395.1	481.0	481.0	5
17	17.8	7.5	652.8	189.0	326.4	326.4	439.5	5
31	17.8	7.5	670.0	189.0	360.7	309.4	451.5	5
B. 3	17.8	8.0	721.5	206.1	377.9	343.6	535.0	8
17	14.4	8.0	670.5	189.0	343.6	326.4	478.8	6
31	14.4	8.0	652.8	189.0	377.9	274.9	–	7
C. 3	16.4	8.0	755.9	171.8	412.3	343.6	530.0	6
17	13.2	8.0	738.7	171.8	395.1	343.6	500.0	7
31	6.1	8.0	687.1	189.0	377.9	309.2	463.6	8

[1]Total hardness
[2]Total alkalinity
[3]Dissolved oxygen

The channel substrate is a loose aggregate of silt and sand above the flume and gravel and rock below the flume to the confluence of the channel with the marsh.

MARSH.— The marsh is a shallow feature with a surface area of 145,945 ft², mean depth of about one ft, and a total approximate volume of 145,945 ft³. It should be noted that marsh depth can vary as much as 50 percent, depending on water use at the Timpie Wildlife Management Unit. The marsh substrate is a deep, loose aggregate of silt, sand, and detritus.

TEMPERATURE AND CHEMICAL CONSTITUENTS.— Temperature and the chemical constituents of Timpie Springs are reported in Table 1. It should be noted that five days of heavy rain preceded the measurements taken on 17 January 1981.

FISH.— Four species of fish *Gila atraria* (Utah chub), *Lucania parva* (rainwater killifish), *Gambusia affinis* (mosquitofish), and *Micropterus salmoides* (largemouth bass), occupy one or more of the components of the Timpie Springs system (Table 2). According to Sigler and Miller (1963), *M. salmoides* and *L. parva* were introduced prior to 1959, *M. salmoides* to develop a sport fishery, and *L. parva* accidentally. It is probable that *G. affinis* was introduced to control mosquitoes. All populations of all species are self-sustaining.

AQUATIC MACROFLORA.— The major species of aquatic macroflora are listed in Table 3.

AQUATIC MACROINVERTEBRATES.— The major aquatic macroinvertebrates of Timpie Springs are listed in Table 4. It should be noted that both the occurrence and numbers of many invertebrates are dependent on seasonal climatic conditions. For example, the week prior to our sampling of 17 October 1981 was cool, with air temperatures ranging from 1.6–4.4 C. Both larval and adult mosquitoes, which had been numerous on 3 October 1981, were conspicuously and pleasantly absent on 17 October 1981.

TABLE 2. Fishes of Timpie Springs, Tooele Co., Utah.

Species	Location[1]	Frequency[2]
Gila atraria	P	C
	C	C
	M	C
Gambusia affinis	P	VC
	C	C
	M	VC
Lucania parva	P	C
	C	C
	M	VC
Micropterus salmoides	P	C
	C	NP
	M	NP

[1]P = pond, C = channel, M = marsh.
[2]VC = very common, C = common, UC = uncommon, R = rare, NP = not present.

SUMMARY

Timpie Springs is an aquatic system surrounded by typical cold-shrub desert. Major human modification includes the introduction of three species of nonnative fish, the construction of gravel roads, and grazing by cattle. Recreation use includes fishing and some hunting. The spring waters are neces-

TABLE 3. Major aquatic macroflora of Timpie Springs, Tooele Co., Utah.

Type and genus	Location[1]	Frequency[2]
Pepperwort		
Marsilea sp.	P	C
	C	NP
	M	R
Water nymph		
Najas sp.	P	VC
	C	VC
	M	VC
Blue-green algae		
Enteromorpha sp.	P	VC
	C	C
	M	VC
Oscillatoria sp.	P	C
	C	R
	M	C
Lyngbya sp.	P	VC
	C	R
	M	UC
Green algae		
Chara sp.	P	C
	C	R
	M	VC
Cladophora sp.	P	UC
	C	R
	M	UC
Spriogyra sp.	P	UC
	C	R
	M	UC

[1]P = pond, C = channel, M = marsh.
[2]VC = very common, C = common, UC = uncommon, R = rare, NP = not present.

TABLE 4. Major aquatic macroinvertebrates of Timpie Springs, Tooele Co., Utah.

Type	Order	Location[1]	Frequency[2]
Mosquito	Diptera	P	VC
	C	VC	
	M	VC	
Dragonfly	Odonata	P	C
Damselfly		C	C
		M	C
Mayfly	Ephemeroptera	P	C
		C	C
		M	C
Backswimmer	Hemiptera	P	VC
		C	C
		M	VC
Crustacean	Amphipoda	P	VC
	(*Hyalella*)	C	VC
		M	VC
Snail (Gastrapoda)		P	VC
		C	VC
		M	VC

[1]P = pond, C = channel, M = marsh.
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sary to maintain the aquatic habitats of the closely adjacent Timpie Wildlife Management Unit.

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