

MACROINVERTEBRATES AND VERTEBRATES OBSERVED IN COTTONWOOD AND WILLOW TANKS

CLASS	ORDER	FAMILY	SPECIES	COMMON NAME
GASTROPODA	Limnophila	Physidae	<u>Physella</u> sp.	pond snail
CRUSTACEA	Anostraca	Branchinectidae	<u>Branchinecta lindahi</u>	fairy shrimp
		Streptocephalidae	<u>Streptocephalus texanus</u>	fairy shrimp
	Conchostraca	Limnadiidae	<u>Eulimnida texana</u>	clam shrimp
INSECTA	Ephemeroptera Odonata	Baetidae	<u>Baetis</u> sp.	mayfly (nymph)
		Aeshnidae	<u>Aeshna walkeri</u>	blue darner (nymph)
		Libellulidae	<u>Pantala hymenea</u>	globe skimmer (nymph)
		Corduliidae	<u>Somatochlora semicircularis</u>	dragonfly
		Lestidae	<u>Archilestes grandis</u>	damselfly (nymph)
		Coenagrionidae	<u>Enallagma praevarum</u>	damselfly (nymph)
	Hemiptera	Notonectidae	<u>Notonecta kirbyi</u>	backswimmer
		Corixidae	<u>Graphocorixa abdominalis</u>	boatman
			<u>Corisella edulis</u>	boatman
		Gerridae	<u>Gerris remigis</u>	water strider
	Trichoptera	Limnephilidae	<u>Limnephilus atercus</u>	caddisfly (larva)
	Coleoptera	Gyrinidae	<u>Gyrinus plicifer</u>	whirligig beetle
		Hydrophilidae	<u>Berosus punctatissimus</u>	water scavenger beetle
			<u>Tropisternus ellipticus</u>	" " "
			<u>Deronectes striatellus</u>	pred. diving beetle
		Dytiscidae	<u>Rhantus gutticollis</u>	" " "
			<u>Laccophilus maculosus</u>	" " "
			<u>Agabus ilybiiformis</u>	" " "
			<u>Agabus disintegratus</u>	" " "
	Diptera	Chironomidae	<u>Chironomus</u> sp.	midge (larva)
		Tabanidae	<u>Tabanus</u> sp.	horsefly (larva)
		Culicidae	<u>Culex tarsalis</u>	mosquito (larva)
			<u>Culex tarsalis</u>	mosquito (larva)
VERTEBRATA	Anura	Pelobatidae	<u>Scaphiopus intermontanus</u>	spadefoot toad
		Bufonidae	<u>Bufo punctatus</u>	Red-spotted toad
			<u>Bufo woodhousei</u>	Woodhouse toad
		Hylidae	<u>Hyla arenicolor</u>	canyon treefrog

COMMON NAME	Functional Feeding Group	Aquatic Community	Habit	General Information
land snail	Grazer/scrapper	littoral/benthos	Climbers/clingers	Highest densities in large, permanent shady tanks; never seen in temporary tank. May see its gelatinous egg masses in May. Populations low by Aug. and Sept.
Fairy shrimp	Suspension feeder	nekton/benthos	Swimmers	<u>S. texanus</u> more common in permanent tanks, and <u>B. lindahli</u> is almost exclusively found in temporary tanks; abundant in some tanks but not regionally common. The two species were never found together in the same tank, although they may use the same tank at different times.
clam shrimp	Suspension feeder	nekton/littoral	Swimmers	Only found in 3 tanks, never very abundant; associated with vegetation.
Mayfly nymph	Grazer/scrapper	benthos	Clingers	Graze on algae and sometimes found in tanks in very high densities (e.g., 515/m ²). Important prey species. More common in permanent than in temporary pools.
blue damselfly (dragonfly)	Predators (engulfers)	littoral/benthos	Climbers	Prefer permanent tanks, but occasionally found in temporary tanks. Attain highest densities in July and August. Adults commonly seen mating (wheel formation) and ovipositing in vegetation of the tanks. Maximum density observed was 2.9/m ² . Overwinter as nymphs.
Globe skimmer (mayfly)	Predators (engulfers)	benthos	Sprawlers	Same as for blue damselfly except oviposit by dipping the abdomen into the water, dispensing eggs.

damselfly	Predators (engulfers)	littoral/benthos	Climbers	Primarily inhabit permanent tanks like the other Odonates, densities are high ($> 10/m^2$) in late August during maximum cladoceran abundance when tadpoles are not abundant and backswimmer populations are declining. Oviposit into stems and leaves of plants (endophytically).
backswimmer	Predators (piercers)	nekton/benthos	Swimmers/ climbers	Colonizes almost every tank in the willow and cottonwood drainages except those that never develop a prey base. Lays eggs on twigs and exposed roots in early April; eggs hatch 20 days later. Goes through 6 molts in May and June, and many tanks have large populations (up to 130/L) by June. Only adults are winged so there is intense intraspecific competition for food among nymphs confined to the tanks. Will deplete a tank of zooplankton and cannibalism is not uncommon.
boatman	Predators/ deposit feeders	nekton/benthos	Swimmers	Found in all sizes and types of tanks. Comes to the surface to grab a bubble of air which it holds dorsally between its wings and abdomen plus an exposed thin bubble on the ventral side. Uses this bubble as its source of oxygen. Has to be replenished periodically. Has stridulatory mechanisms for communication (as do the other hemipterans).
water strider (piercers)/	Predators	neuston	Skaters	Highest numbers found in large permanent sunny tanks. In a single colony some individuals have fully developed wings, others have partly developed wings, and others have no

wings. In general, gerrids are rarely seen flying. Overwinter as adults in protected areas near water. Eggs are laid in spring and summer, glued to objects at the water's edge or floating on the surface. Hatch in about 2 weeks and have five instars (i.e., periods between molts). Has scent glands to inhibit predators.

caddisfly	Deposit feeders	benthos	Climbers/ sprawlers	Lays eggs in November, uses the tanks throughout the winter, then forms pupae in April and May. By mid-May, most individuals have emerged as winged adults. Cases are made with silk excreted from their labium (i.e., lower lip). Cases serve as protection against predators and as a means of getting oxygen (undulate within the case to create a current over the gills). Pupate by fastening the case with silk to a solid substrate, and seal off the ends. Adults live for at least 3 months.
whirligig beetle	Predators (engulfers)/ scavenger	neuston	Surface swimmers/ divers	Avoid small and temporary tanks; population levels appear to be somewhat correlated with tank volumes. Highest numbers (swarms of 100-200) found in large permanent sunny tanks. Eggs are laid on stems of emergent vegetation a few cm below the surface. Hatch in 1-2 weeks and go through 3 instars. Larvae have lateral gills. Pupate on shore above water level. Adults eyes are divided in two parts, one part below water and the other part above.

water scavenger beetle	Deposit feeders/ herbivore (piecers)	nekton/benthos	Swimmers/ climbers	Adults lay eggs under water in silk cases that may contain >100 eggs. Larvae go through 3 instars. They are predaceous but are poor swimmers so tend to lie in wait for prey. Leave water to pupate. Carry bubble of air which periodically needs to be replenished.
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predaceous diving beetle	Predators (piecers)	nekton/benthos	Swimmers/ divers/ climbers	All beetles had low density (usually <1/m ²). Adults appear to leave the tank after laying eggs since they co-occurred with their larvae on only 50% of the observations. Most species found in the tanks have a cutting ovipositor allowing them to insert their eggs into parts of living plants or they lay them on plant surfaces. Larvae have 3 instars; pupate on land. Adults readily fly.
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midge larva	Deposit feeders	benthos	Burrowers	Important prey food for many predators. High tolerance to a wide range of environmental conditions. Often used to characterize the overall ecological condition of an aquatic system. Have 4 life stages (egg, larva, pupa, adult). Some have hemoglobin (bloodworms) which provides a source of oxygen. The adult stage lasts only a few days and performs the functions of reproduction and dispersal.
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horsefly larva	Predators (piercers)	benthos	Sprawlers/	Scarcity of information on this family.
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mosquito larva	Collectors-- gatherers and filters	plankton/neuston	Planktonic/ swimmers	Found in most tanks. Females glue their eggs together in raftlike masses, which they deposit on the water surface. Larval development usually short (10 days) under favorable conditions. The pupa floats on the water surface. The adult usually emerges in 3-4 days.
Spadefoot toad (tadpoles)	Deposit feeder	benthos	Swimmers	Lays eggs the first week of April in gelatinous masses attached to a substrate. Fairly widespread in all types and sizes of tanks. Dominates other tadpoles, being much larger than the two <u>Bufo</u> species. Are surface breathers so can survive in water with low dissolved oxygen. By the last week in June most tadpoles are metamorphosing into adults.
Red-spotted toad (tadpole)	Deposit feeder	nektonic/benthos	Swimmers	During 1988-1989, these toads were the most frequent users (among anurans) of small shallow, temporary tanks, although they were also present in most permanent tanks. Egg-laying activity peaked in late May and early June. Is numerically the most abundant anuran and can occur in large numbers (880/m ²). The toads are very small, less than one-quarter the length of spadefoot toads (which are 38-51mm). Like all true toads, they have a parotid gland on each side of the neck. These glands secrete a white poison to inhibit predators.

Woodhouse toad	Deposit feeder	nektonic/benthos	Swimmers	Lays eggs later than other anurans in the tanks (June). Less abundant than the other two toads. Occurs most frequently in permanent tanks. Is the largest anuran present at the tanks (60-130 mm or 2.5 - 5 in.).
Canyon tree-frog	Deposit feeder	nektonic/benthos	Swimmers	Begins reproducing in early June when calls are heard. Tadpoles grow quickly and often are green due to surface algae. They are as large as spadefoot toads (up to 50 mm). Are the least common of the anurans and were observed only in permanent tanks. Toe tips of adults are expanded into stickly adhesive pads used in climbing.

Sources: Haefner, J.W. and A.M. Lindahl. 1991. The ecology of small pools in Capitol Reef National Park, UT: Phase II. Final Report. 172 pp.

Merritt, R. W. and K. W. Cummins. 1984. An introduction to the aquatic insects. 2nd ed. Kendall-Hunt Publishing Co. Dubuque, IA. 722pp.