Bowens Creek
Manistee County, (T24N R16W Sec. 11, 12, 13, 14, 15, 24, and 30).
Last surveyed 2008

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Environment

The Bowens Creek (also referred to as Arcadia Creek) watershed is located in northwestern Manistee County, near the village of Arcadia, Michigan. The Bowens Creek watershed is relatively small, with an area of about 25 square miles or just over 16,000 acres (Fig. 1). Bowens Creek is fed by a number of spring creek tributaries that converge to form the mainstem of Bowens Creek. The primary tributaries in the watershed are Lucker Creek, Toohey Creek, Van Bushkirk Creek, Richley Creek, and Chamberlain Creek. The mainstem of Bowens Creek flows for about four or five miles before it enters Arcadia Lake as a third-order stream. Arcadia Lake is a "drowned rivermouth" lake with a direct connection to Lake Michigan. Virtually the entire Bowens Creek watershed is accessible to migratory fish from Lake Michigan, except where a number of perched culverts prevent fish passage.

The upper portions of the Bowens Creek watershed are sandy hills, out of which the spring creek tributaries flow. The watershed is bowl shaped, with tributaries coming in from the east, north, and south as the mainstem flows generally west. From its headwaters to Arcadia Lake, Bowens Creek drops about 270 feet in elevation. Most of that drop occurs in the upper portion of the watershed, as the lower several miles of Bowens Creek flow through a relatively low gradient, swampy area known locally as the Arcadia Marsh. The watershed is mostly forested, although there is some agriculture in the area, mostly fruit orchards along with some livestock operations. Most of the watershed is in private ownership, although in the last several years the Grand Traverse Regional Land Conservancy (GTRLC) has either purchased or protected with conservation easements about 4,000 acres (about 25%) of the Bowens Creek watershed. Although most of the protected land is in the hilly northern portion of the watershed, there are also several large parcels in the Arcadia Marsh, totaling about 155 acres. These parcels have significant stream frontage on Bowens Creek.

Substrates in the hilly upper portions of the watershed consist mostly of sand; while further downstream in the lowlands the soils consist of sand, muck, and some clay. Sand however is the predominant substrate in the watershed. There are a few areas that have significant amounts of gravel, but these gravel patches are restricted mostly to high gradient areas. The lower portion of Bowens Creek in the Arcadia Marsh has been degraded by human activities. According to Chris Sullivan (GTRLC, personal communication), in the 1880s a railroad grade was constructed through the marsh, and a portion of the creek was diverted to run alongside the railroad grade. In the late 1950s and early 1960s, the marsh was drained (by dredging Bowens Creek) and then farmed. Currently, the majority of the flow of Bowens Creek is running through the ditched channel along the railroad grade, with only a small percentage of the flow in the original channel of Bowens Creek.

Bowens Creek and all of its tributaries are Designated Trout Streams by Michigan Department of Natural Resources (MDNR), and all are classified as Type 1 streams. Type 1 streams are open to fishing only during the "regular" trout season, which runs from the last Saturday in April through September 30. The minimum size limit for brook trout and brown trout is 8 inches, and 10 inches for

rainbow trout, coho salmon, and Chinook salmon. The daily possession limit for trout or salmon is five fish, with no more than three fish 15 inches or larger.

History

Very little information exists on the original species composition of Bowens Creek. Because it is a coldwater stream, it is possible that arctic grayling were the original native salmonid since brook trout were not native this far south. The Bowens Creek watershed certainly possesses the water quality to have hosted arctic grayling. In other area streams, the grayling disappeared around 1900, and were replaced by other salmonids including brook trout, brown trout, and rainbow trout (Tonello 2005). Since brook trout were native to other areas of Michigan, they usually were introduced first, with the other trout species following in later years. Other native species that likely would have inhabited the Bowens Creek watershed might have included sculpin, white sucker, central mudminnow, and brook stickleback.

Unfortunately, fish stocking records for the first part of the 20th century were destroyed in a fire. The remaining records start in the mid-1930's. From the mid-1930's through the early-1960's, the Michigan Department of Conservation (MDOC, the precursor to today's MDNR) stocking program for the Bowens Creek watershed consisted of brown, brook, and rainbow trout plants aimed at creating or enhancing fishing for resident trout (Table 1). Since the early 1960s, no trout have been stocked into the watershed by the State of Michigan. Coho and Chinook salmon were first stocked into Lake Michigan in the late 1960s, and although none were ever stocked into Bowens Creek, both species have since established naturally reproducing populations in the Bowens Creek watershed.

The first known fisheries surveys of the watershed were conducted in June of 1966. In that effort, a total of eight sites on Toohey Creek, Lucker Creek, Chamberlain Creek, the mainstem of Bowens Creek and several unnamed tributaries were sampled by backpack electrofishing (Fig. 2; Table 2). Salmonids were found at all stations. Brook trout were found in Van Bushkirk, Chamberlain, Toohey, Lumley, and Bowens Creeks. Brown trout were found at all sites except for the Toohey Creek site. Rainbow trout were found in Richley and Bowens Creeks. Since no trout had been stocked into the watershed since 1961, it is presumed that all of the trout captured in the 1966 survey were naturally reproduced. The rainbow trout were likely juvenile steelhead. White sucker and mottled sculpin were the only other species recorded in the 1966 surveys.

Current Status

The most recent fisheries surveys of the Bowens Creek watershed were conducted on May 7, 2008, and July 1, 2008. The surveys were conducted with the use of a Wisconsin battery-powered 12-volt backpack shocker. A total of eighteen different sites within the watershed were sampled (Fig. 3). The sampling technique was a basic one-pass effort, aimed at determining the presence or absence of species at any particular site. The lengths of survey stations were between 50 and 300 feet, depending on the location and characteristics of that site. Any fish captured were immediately returned to the water after being measured, and no age/growth information was obtained.

Salmonids, including brown trout, brook trout, rainbow trout, and coho salmon were documented at many dfferent sites throughout the watershed. All sites except for three had at least one species of salmonid present. Rainbow trout were present at the most sites (13), with brown trout and coho salmon present at 12 sites. Brook trout were present at five sites. The only other species that was present in most of the watershed was sculpin, which was present at ten sites. Other species observed in the watershed included brook stickleback (five sites), central mudminnow (five sites), yellow perch (three sites), and white sucker (two sites); creek chub, pumpkinseed sunfish, and johnny darter were all observed at only one site.

Two of the sites where no salmonids were caught included Tondu Creek (site 10) and the unnamed tributary directly to the south of Tondu Creek (site 11). These two streams showed signs of having been ditched and/or dredged in the past. Both flowed through agricultural fields, and both had very little flow. The third site where no salmonids were documented was a braid of Bowens Creek that runs parallel to the railroad grade down in the marsh (Site 16). At that site, no fish of any kind were caught.

At most of the sites in the 2008 survey (Table 3), the primary substrate was sand, with gravel being relatively rare. The best gravel habitat was found in Bowens Creek at site 2, which is fairly high in the watershed, in a high gradient stream stretch. Not surprisingly, this was also where we captured an adult steelhead in spawning phase. The sites on Richley Creek (3, 4, and 5) and Chamberlain Creek (12) also had higher percentages of gravel. Another common habitat theme in the watershed were poor road/stream crossings. Many sites had undersized or improperly-placed culverts that have resulted in scour and erosion.

Bowens Creek itself exhibited particularly poor habitat downstream of St. Pierre Road, which is the area known as the Arcadia Marsh (Table 3; sites 13-18). Substrates in this area were almost completely sand and silt, with only a few small patches of gravel present. There is very little channel diversity or woody cover in this area, with most of the stream being flat, sandy, overly wide, and overly shallow. Despite the poor habitat in this area, brown trout up to 23 inches in length were caught, along with good numbers of juvenile coho salmon and rainbow trout. Wherever there was the slightest amount of cover, depth, or channel diversity, salmonids were present. In addition to the 23 inch specimen, five other brown trout larger than 15 inches in length were captured in the marsh, and even more between 10 and 15 inches in length were caught.

Although no Chinook salmon were documented in this survey, it is known that adult Chinook salmon run upstream and spawn in Bowens Creek annually (Steve Converse, MDNR Law Enforcement Division, personal communication). It is likely that they reproduce successfully and are self-sustaining. It is likely that we did not observe any juvenile Chinook salmon in the 2008 survey because they had already smolted out to Lake Michigan.

Analysis and Discussion

According to the 1966 survey data, most of the Bowens Creek watershed was capable of supporting salmonids. This does not appear to have changed in the 42 years that have passed since then. The most noticeable difference between the 1966 and 2008 surveys is the presence of coho salmon at many sites in the watershed. Juvenile steelhead also appear to be much more abundant and widespread in the watershed in 2008 than in 1966. Robust resident populations of brook and brown trout remain present

in the watershed, and they do not appear to have been negatively impacted by the presence of coho and Chinook salmon, or by the increase in abundance of juvenile steelhead.

Despite having relatively poor habitat, nearly the entire Bowens Creek watershed continues to support naturally reproducing populations of salmonids, including brown trout, brook trout, rainbow trout (steelhead), coho salmon, and Chinook salmon. This is likely due to the fact that most of the tributaries are groundwater-fed spring creeks with cool summer water temperatures. Even the lower portion of the watershed in the Arcadia Marsh, which has very poor fish habitat, supports a population of large resident brown trout, in addition to juvenile coho salmon and steelhead. Once again, this must be due the groundwater-fed nature of the watershed. Although no temperature data has been collected in the watershed, it is likely that even in the Arcadia Marsh, the water temperatures of Bowens Creek remain relatively cold in the summer.

Due to its small size, Bowens Creek will probably never be a "destination" fishery, even though there are clearly some quality fish to be caught. However, Bowens Creek and its tributaries can certainly offer excellent small-stream angling opportunities. In addition, the migratory salmonids naturally produced in Bowens Creek (steelhead, coho salmon, Chinook salmon, and possibly brown trout) will continue to provide recreation for Lake Michigan anglers, including boat anglers, pier anglers, and shore anglers.

Management Direction

Currently, the Bowens Creek watershed produces good numbers of wild salmonids without stocking. Many of the fish produced in Bowens Creek are migratory salmon and steelhead that can provide angling opportunity in Lake Michigan. Development in the watershed should be done sustainably, without filling wetlands or damaging the stream in any way. Unwise development in the watershed may lead to further degradation of the watershed and elevation of water temperatures. Instead, the rural nature of the watershed should be maintained, with as much of the watershed as possible managed in a forested, undeveloped state. The acquisition and protection of about 25% of the watershed by the Grand Traverse Regional Land Conservancy is a major step in the right direction for preserving the water quality and fisheries productivity of the Bowens Creek watershed.

The Bowens Creek watershed remains relatively unstudied. A temperature study of Bowens Creek and some of the larger tributaries should be conducted. In addition, the road/stream crossings in the Bowens Creek watershed should be inventoried and ranked according to any damage they may be causing. Procedure 51 (stream habitat assessment) surveys should be completed throughout the watershed to further quantify the level of habitat degradation present in the watershed. Water quality monitoring and invertebrate surveys would also help to provide further enlightenment as to the state of the Bowens Creek watershed.

In addition to protecting and further studying the Bowens Creek watershed, habitat improvement on the Bowens Creek watershed could also be considered. The most critical fisheries habitat project for the watershed is the restoration of Bowens Creek as it flows through the Arcadia Marsh. Currently, the flow from Bowens Creek is split and diverted into side channels and ditches. Combining all of the flow into one channel would likely enhance the ability of the stream to produce salmonids. The fact that much of the Arcadia Marsh is now in the possession of GTRLC should help to facilitate such a project.

If that task is accomplished, there are a number of other techniques that could also help improve the stream environment, including the addition of instream woody material to provide channel diversity, depth, and overhead cover. Fixing the existing poor road/stream crossings should also be done. These should be repaired on a "worst-first" basis as funding becomes available. Directly improving fisheries habitat in the Bowens Creek watershed using these techniques would almost certainly increase the standing crop of resident salmonids present and would also increase the number of outmigrating salmon and steelhead smolts heading for Lake Michigan.

References

Tonello, M. A. 2005. Little Manistee River: Status of the Fishery Report. Michigan Department of Natural Resources, Fisheries Division, Cadillac.

Figure 1. Bowens Creek watershed.

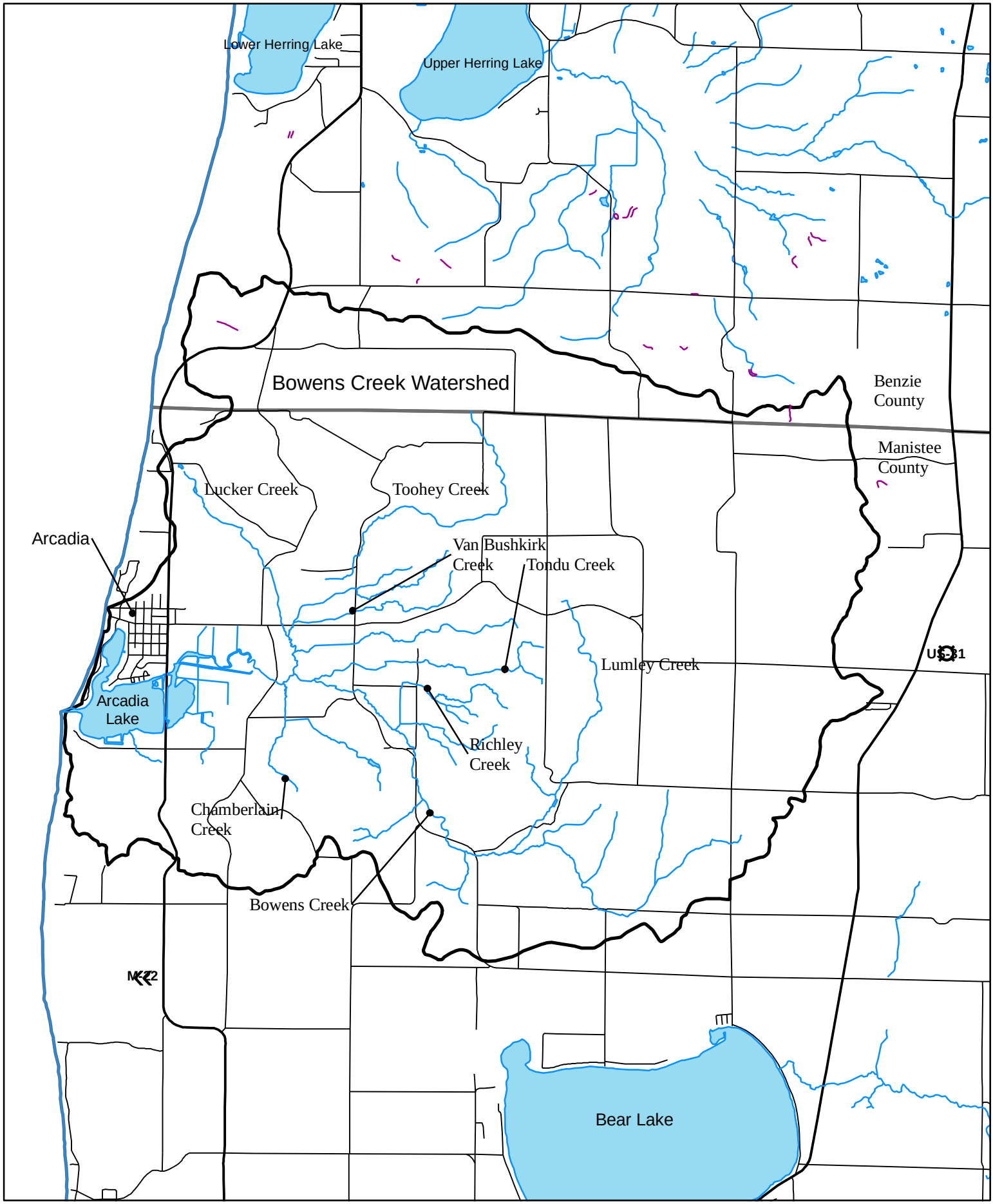

Figure 2. Electrofishing sites from the 1966 MDOC fisheries survey of the Bowens Creek watershed.

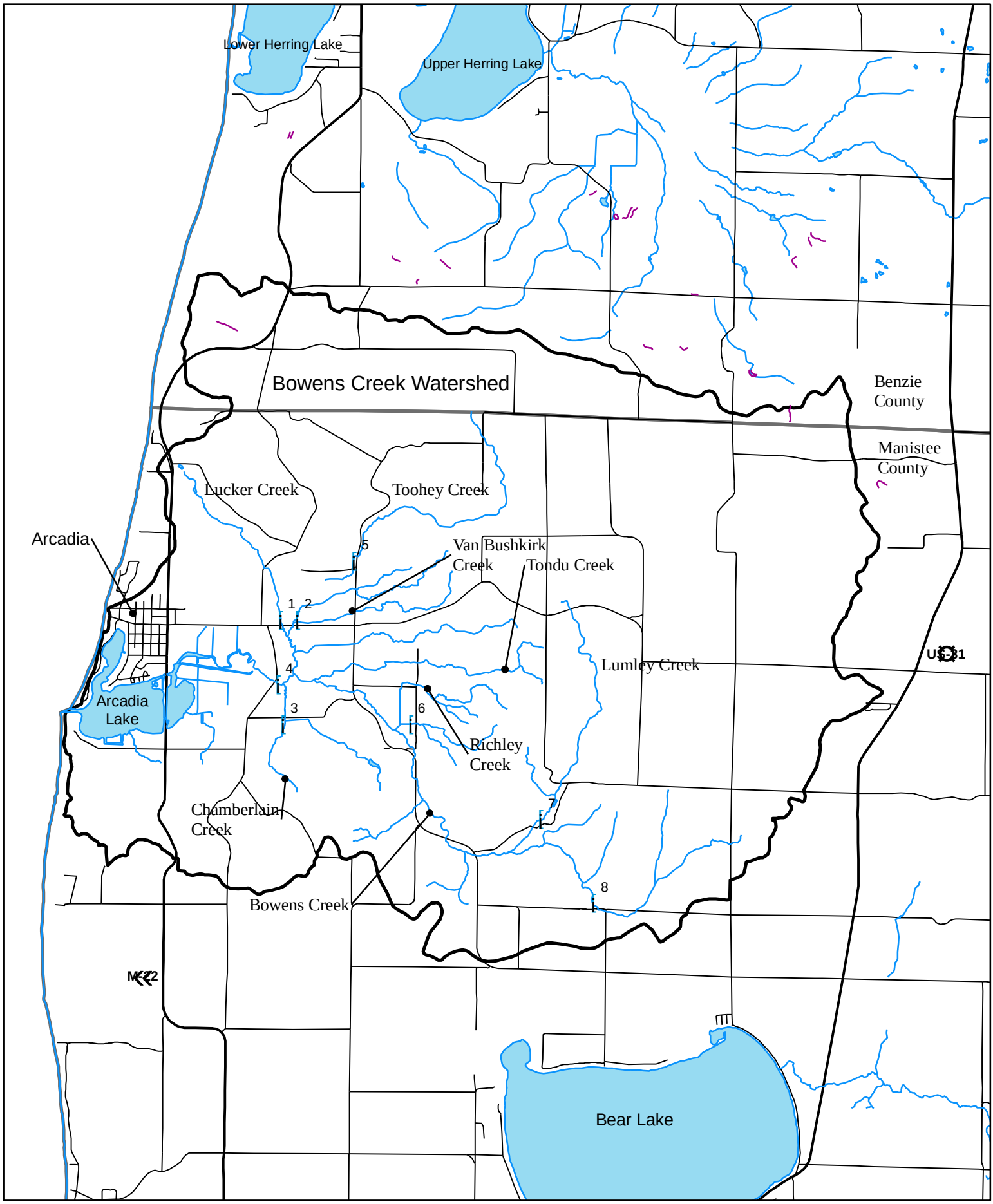

Figure 3. Electrofishing sites from the 2008 MDNR fisheries survey of the Bowens Creek watershed.

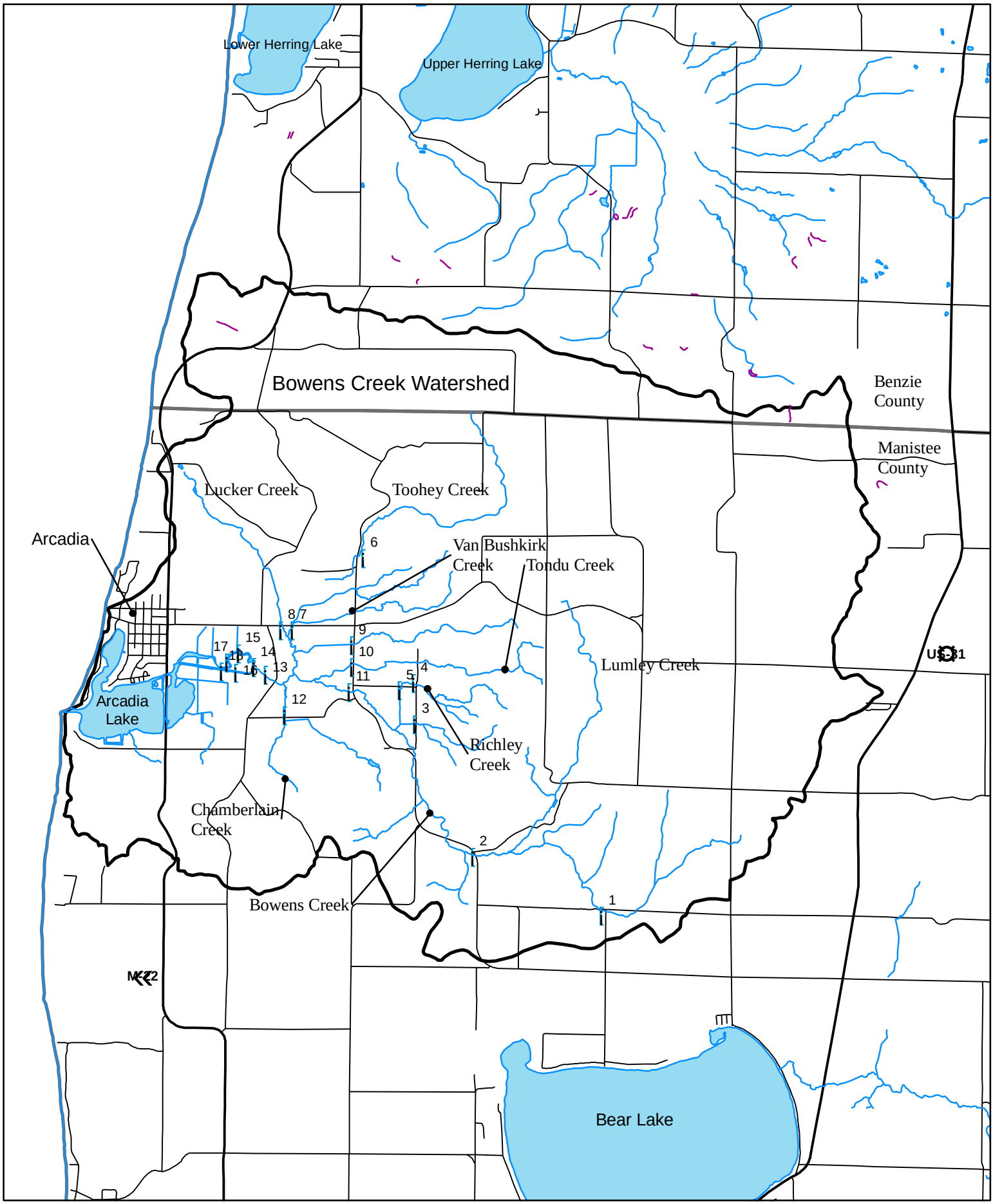

Table 1. Fish stocked by MDOC/MDNR into the Bowens Creek watershed, 1934-2008.

Year	Waterbody	Species		Number	Size
1934	Bowens Cr.	Brook trout		12,000	5 mo. fingerlings
	Chamberlain Cr.	Brook trout		4,000	5 mo. fingerlings
	Lucker Cr.	Brook trout		4,000	5 mo. fingerlings
1935	Bowens Cr.	Brook trout		9,000	7 mo. fingerlings
	Chamberlain Cr.	Brook trout		3,000	7 mo. fingerlings
	Lucker Cr.	Brook trout		3,000	7 mo. fingerlings
1936	Bowens Cr.	Brook trout		11,000	8 mo. fingerlings
	Chamberlain Cr.	Brook trout		3,000	8 mo. fingerlings
	Lucker Cr.	Brook trout		2,000	8 mo. fingerlings
1937	Bowens Cr.	Brook trout		2,000	8 mo. fingerlings
		Brown trout		1,000	8 mo. fingerlings
		Rainbow trout		3,000	5 mo. fingerlings
	Chamberlain Cr.	Brook trout		2,000	8 mo. fingerlings
		Brown trout		1,000	8 mo. fingerlings
		Rainbow trout		2,000	5 mo. fingerlings
	Schimke Cr.	Brook trout		2,000	8 mo. fingerlings
		Brown trout		1,000	8 mo. fingerlings
		Rainbow trout		2,000	5 mo. fingerlings
1938	Bowens Cr.	Rainbow trout		9,000	6 mo. fingerlings
	Chamberlain Cr.	Rainbow trout		4,000	6 mo. fingerlings
	Schimke Cr.	Rainbow trout		3,000	6 mo. fingerlings
1939	Bowens Cr.	Rainbow trout		2,000	7 mo. fingerlings
1940	Bowens Cr.	Rainbow trout		500	7 mo. fingerlings
1941	Bowens Cr.	Brook trout		1,000	5 mo. fingerlings
		Rainbow trout		2,000	8 mo. fingerlings
		Rainbow trout		3,000	3 mo. fingerlings
	Chamberlain Cr.	Rainbow trout		667	8 mo. fingerlings
1942	Bowens Cr.	Brook trout		2,500	6 mo. fingerlings
		Rainbow trout		4,000	2 mo. fingerlings
	Chamberlain Cr.	Brook trout		1,000	6 mo. fingerlings
		Rainbow trout		2,000	2 mo. fingerlings
1943	Bowens Cr.	Brook trout		18,000	3 mo. fingerlings
	Chamberlain Cr.	Brook trout		8,000	3 mo. fingerlings
	Lucker Cr.	Brook trout		5,000	3 mo. fingerlings
1946	Bowens Cr.	Brook trout		500	adult
		Brown trout		400	yearlings
	Chamberlain Cr.	Brook trout		50	adult
	Toohey Cr.	Brook trout		50	adult

Table 1. Fish stocked by MDOC/MDNR into the Bowens Creek watershed, 1934-2008.

1947	Bowens Cr.	Brown trout		625	adult
	Chamberlain Cr.	Brook trout		200	adult
	Richley Cr.	Brook trout		100	yearlings
		Brown trout		175	adult
1948	Bowens Cr.	Brown trout		600	yearlings
	Richley Cr.	Brown trout		250	yearlings
1949	Bowens Cr.	Brown trout		700	yearlings
	Richley Cr.	Brown trout		650	yearlings
1950	Bowens Cr.	Brown trout		600	yearlings
	Chamberlain Cr.	Brown trout		175	yearlings
	Richley Cr.	Brown trout		300	yearlings
1951	Bowens Cr.	Brown trout		1,350	yearlings
	Chamberlain Cr.	Brook trout		300	yearlings
		Brown trout		200	yearlings
	Richley Cr.	Brown trout		400	yearlings
1952	Bowens Cr.	Brown trout		900	yearlings
	Chamberlain Cr.	Brown trout		400	yearlings
	Richley Cr.	Brown trout		700	yearlings
1957	Richley Cr.	Rainbow trout		800	legal
1958	Richley Cr.	Rainbow trout		1,000	legal
1959	Richley Cr.	Rainbow trout		1,000	legal
1960	Richley Cr.	Rainbow trout		800	legal
1961	Richley Cr.	Rainbow trout		600	legal

Table 2. Sites sampled in the Bowens Creek watershed in 1966 and 2008. The 1966 site numbers correspond with the map in Fig. 2, and the 2008 site numbers correspond with the map in Fig. 3.

1966 Site #	Waterbody	Brook trout	Brown trout	Rainbow trout	Coho salmon	Sculpin	White sucker	Brook stickle-back	Central mud-minnow	Yellow perch	Creek chub	Pumpkin-seed sunfish	Johnny Darter
1	Lucker Cr.		x			x							
2	V. Bushkirk Cr.	x	x										
3	Chamberlain Cr.	x	x										
4	Bowens Cr.		x				x						
5	Toohey Cr.	x											
6	Richley Cr.		x	x									
7	Lumley Cr.	x	x										
8	Bowens Cr.	x	x	x		x							
2008 Site #													
1	Bowens Cr.	x	x	x		x							
2	Bowens Cr.		x	x	x	x							
3	Richley Cr.	x		x	x	x							
4	Richley Cr.		x	x	x								
5	Richley Cr.			x	x	x							
6	Toohey Cr.	x	x			x							
7	V. Bushkirk Cr.				x	x		x	x	x			
8	Lucker Cr.	x	x	x	x	x		x	x	x			
9	Unnamed trib.								x		x		
10	Tondu Cr.							x	x				
11	Bowens Cr.		x	x	x	x							
12	Chamberlain Cr.	x	x	x	x	x							
13	Bowens Cr.		x	x	x	x	x					x	
14	Bowens Cr.		x	x	x								
15	Bowens Cr.		x	x	x		x						
16	Bowens Cr.												
17	Bowens Cr.		x	x	x			x	x	x			
18	Bowens Cr.		x	x				x					x

Table 3. Site characteristics from the 2008 MDNR fisheries survey of the Bowens Creek watershed.

					Estimated substrate composition				Estimated stream morphology		
Site #	Date sampled	Waterbody	Estimated average width, ft.	Estimated average depth	% sand	% gravel	% clay	% silt	% riffle	% run	% pool
1	5/7/08	Bowens Cr.	6	6 in.	95	5			5	90	5
2	5/7/08	Bowens Cr.	10	1 ft.	50	50			50	25	25
3	7/1/08	Richley Cr.	5	1 ft.	40	50		10	50	35	15
4	7/1/08	Richley Cr.	7	1 ft.	40	40		20	10	10	80
5	7/1/08	Richley Cr.	3	6 in.	40	40		20	70	10	20
6	7/1/08	Toohey Cr.	4	3 in.	20	80			50	35	15
7	7/1/08	V. Bushkirk Cr.	8	4 in.	10	5		85	5	50	45
8	7/1/08	Lucker Cr.	15	3 in.	40		10	50		80	20
9	7/1/08	Unnamed trib.	4	3 in.	50			50		60	40
10	7/1/08	Tondu Cr.	2	6 in.		10	15	75	5	15	80
11	5/7/08	Bowens Cr.	12	1 ft.	98	2				90	10
12	5/7/08	Chamberlain Cr.	8	1 ft.	70	25	5			75	25
13	5/7/08	Bowens Cr.	20	1.5 ft.	90	10			5	85	10
14	5/7/08	Bowens Cr.	8	2 ft.	95		5			80	20
15	5/7/08	Bowens Cr.	15	2 ft.	100					50	50
16	5/7/08	Bowens Cr.	15	3 in.				100		100	
17	5/7/08	Bowens Cr.	20	6 in.	100					90	10
18	5/7/08	Bowens Cr.	20	6 in.	90	10				100	