

Spawning Survey Narrative—Holtwood Spillway area

Ten surveys to occur weekly by boat; look for evidence of centrarchid nesting or reproduction. Areas Covered: West Pool; Upper Middle Pool; Lower Middle Pool; Bridge Pool. See map.

Survey 1—31 May—performed in conjunction with spring pram electrofishing survey (suitable boat not yet available). Noted no evidence of nesting fish throughout the route traversed during electrofishing. Observed schools of fry along each pool margin in shallow water. Also, at junction of Lower Middle and Upper Middle pools, observed (photos) large school of “black fry”, YOY smallmouth bass. School stayed together when disturbed but was not tightly aggregated. Fish size approximately 0.5 inch. Later, another school of black fry seen at eastern end of West Pool. Fish were same size. Water temperature = ~24C.

Note: per Matt LeBlanc, FPL Energy, pers. comm. to DDR: Smallmouth bass will utilize small patches of gravel substrate accumulated in depressions in bedrock substrates/slabs (and likely behind larger boulders).

Survey 2—7 June—used canoe to paddle through West, Upper Middle, and Lower Middle pools. No fish noted on nests. Observed adult carp, quillback, smallmouth bass. Noted juvenile smallmouth bass in pool perimeters but they were larger (0.5-1.0 inch), and very loosely aggregated, if at all. Also traversed shallow inflow area upstream of pool with quiet pools, flowing water, and wetted *Justicia* beds interspersed. Noted schools of YOY, likely suckers, in quiet areas and over *Justicia*, with individual smallmouth bass YOY mixed among the other YOY. No smallmouth bass YOY were schooled in this reach—they had dispersed. Water temp = 25C.

An area of medium cobble to small boulders exists along the east shore of the island that separates West Pool from Middle pools. Potential spawning area given the large substrate elsewhere and proximity to *Justicia*. No evidence of use by spawning fishes; however this reach of Lower Middle Pool contained numerous adult rock bass.

Also visited Bridge Pool on foot and waded entire area. Noted same adult species, plus an unidentified darter. Also saw YOY smallmouth bass dispersed among quiet areas mixed with other species. Likely mostly suckers.

Made observations of “possible” nesting sites in 15-18 inches of water. Areas were gravel that appeared without the algae coating of surrounding bedrock and boulders but it was not clear that the area had been swept clean by a fish—each are was associated with a medium-sized boulder (15-24 inches diameter). Without a fish attending, and given the size of smallmouth bass YOY on June 7, spawning likely took place in early May. Some YOY bass at least 1 inch long.

Survey 3---June 14 canoed West (26C), Upper Middle (26C), and Lower Middle (26C) pools. No nesting fish were observed. Observed 2 smallmouth bass in West and Upper Middle pools and carp at all sites. Water levels were down from the previous week so most of the Lower Middle pool was not boatable. Juvenile smallmouth bass were observed in all pools. However, they were generally singles. No dense groups were observed.

Attempted to survey the Bridge Pool (no temp taken) by canoe but limited water depth prohibited effective observations. Water clarity was excellent for the initial portions of the surveys but the wind picked up, limiting viewing later in the morning.

Survey 4---June 22 Paddled West Pool first. Water temp = 23C. Observed a few 1-inch smallmouth bass YOY. Found no centrarchid nests. Sampled Middle Pool next. This pool has become shallower as overall water levels in the spillway reach have declined. Used the view bucket for most of the sampling. Several YOY SMB were observed. No nests were found. Water temp 23.1C. Next surveyed Upper Middle pool. The wind picked up making observations difficult. Saw several SMB and YOY quillback. About 20-25 SMB fry seen at inflow area with sandy-gravel-cobble substrate. Water temp was 24C. No nests were observed.

The Bridge Pool had less water than the previous week. Water temp = 21.5C, noticeably cooler than elsewhere (note: small west shore trib feeds this reach and may supply cooler water). Observed numbers of 1-2 inch SMB and quillback; also 3-4 groups of smallmouth fry (1") well hidden.

Survey 5---June 28 Followed same sampling routine as in previous events except the Lower Middle pool was sampled by wading and view buckets were used. Wading was necessary due to further decline in water levels. SMB and quillback YOY were observed in all pools. Quillback were concentrated in the weedy edges of the Lower Middle Pool. Water temperatures: West Pool = 25.5C, Upper and Lower Middle = 26C, Bridge Pool = 22C. The Bridge Pool was surveyed by walking both pool edges along with some wading due to low water levels and pool contraction. Water clarity at all sites was good.

Survey 6---July 5 Traversed West and Middle Upper pools by canoe; the rest by wading due to very shallow water. No spills since early May and river flow on 7/5 at Marietta was 8,100 cfs. West = 26C; Middle Upper = 26C; Middle Lower = 27.5C; Bridge Pool 25C near shore, 28.5C ~50 yards offshore. *Justicia* and sedges grown to 12-18 inches high along pool borders.

Overcast and breezy conditions made viewing pools and river substrates difficult except in lee areas. Saw numerous SMB YOY from 1-3 inches in length in all reaches/pools. Bass utilized cover objects such as boulders but also seen in open water over bedrock bottom. Also, quillback YOY have grown to about 3 inches and several schools were seen, mostly in protected smaller pools. In Middle Upper pool a green sunfish in a sheltered position between two rocks was observed—the substrate was small gravel and it could have been guarding a nest given its position and the substrate—however it did not chase smaller fish (YOY SMB) that approached the opening (disturbed by us in canoe??). Impression in Bridge Pool was fewer fish than other pools.

Visited new pool east of Middle Upper (East Pool) where two sandy beaches are seine sites. Looking for different substrate at lower end of pool; nothing different found. Was thinking a sandy area may occur due to sand abundance elsewhere in pool.

Noted temperature gradient in Bridge Pool; sharp transition area about 50-60 yards off west shore. Tributary inflow above pool likely.

During survey, two YOY smallmouth bass were noted dead in pool edges.

Survey 7---11 July – DDR JCA- Surveyed West Pool and Lower Middle. West Pool was done by canoe and the Lower Middle was surveyed on foot. Water clarity was terrible and likely due to heavy rains that occurred over the weekend (9-10 July). Saw a few YOY smallmouth 1-3" in both pools and also some YOY quillback. Also noted a SMB about 9" in the Lower Middle pool. Due to poor water clarity we terminated the remainder of the survey.

Survey 7 cont'd; 15 July--- DDR only- Surveyed the Bridge Pool. Water clarity was OK due to the limited depth of this pool. I saw several YOY smallmouth and quillback. No centrarchid nests or signs of nesting were observed. I spoke with Chris Porse-PPL Holtwood about spill on the weekend of 9-10 July. Spill occurred during evening Fri 8 July and early morning Sat 9 July (see below for complete spill history during survey period).

Survey 8----18 July – SA, CA- Surveyed West Pool and Upper Middle with canoe. Bridge Pool and Middle Lower surveys were conducted on foot.

0855h West Pool water temperature, 26.5°C, water clarity, very good. Saw many 2 – 2.5 in small mouth bass, and many school of fish (likely quillback). Noticed one darter but could not identify. Noticed 1-in smallmouth with what looked to be a white fungus/bacterial growth on side near gill. Fish was very stressed and appeared to be near death.

0925h Middle Lower water temperature, 26°C, water clarity was okay. Again too shallow to float, circumnavigated pool on foot and met near middle. Due to windy conditions, visibility was poor. Again, noticed smallmouth bass with horrific damage to back side, looked white and again appeared to be either fungus/bacterial growth on caudal peduncle side. We did notice one sunfish, possible bluegill, about 2 in long. Plenty of quillback in pool and in adjacent channels.

0945h Middle Upper water temperature, 28.1°C, water clarity was good. Noticed more smallmouth with same white fungus/bacterial markings, fish also appeared highly stressed. Noted largemouth bass, about a foot long, near pool inflow. The fish observed in this pool were larger, *i.e.*, several large carp, quillback, and largemouth bass. Observed some bluegill and/or sunfish. Fish are getting bigger and might be moving into deeper waters. *Might keep an eye on the fungus/bacterial issue?* (ETE note-prophetic statement—subsequent article in Lancaster Intelligencer Journal 7/26 and PFBC press release about fungus/bacterial infections in Susquehanna River black bass.

Survey 9----26 July-SA, CA- Surveyed West Pool and Lower Middle with canoe. Bridge Pool and Middle Lower were conducted on foot. Started with Bridge Pool @ 720h, water temperature, 21°C, with water clarity relatively good. More water here in pool than previous week. Noted two YOY smallmouth bass, 2-in long. Observed a little current coming through, probably helped out by the rain received Sunday night. As we circumnavigated the pool, observed more (“few”), pockets of smallmouth bass, 2 in long. Picked up a largemouth bass with white fungus/bacterial growth on left side. Upon further investigation, the “sore” was on both sides of gills. Fish was highly stressed, and had lost equilibrium. Fish was easily captured and upon return to water, it turned belly up.

0820h, West Pool, water temperature, 27.5°C, water clarity was very good with little wind. Several schools of quillback and large carp were scattered throughout this pool. We saw few, if any, smallmouth bass, maybe due to illness or they moved into deeper waters. Upon completion of pool, we did not see any smallmouth bass, only quillback and carp were observed in this pool. Steve and I conducted a search within the channels (small, shallow) by foot to search for smallmouth bass and/or any other fish. Again only quillback and carp were observed.

0845h, Middle Lower, water temperature 27°C, water clarity was okay, but too windy to thoroughly see through the water column. We noted more water here probably due to the rain received earlier in the week although not enough water to float. We circumnavigated the pool by foot, meeting in the middle. Did see one bluegill or sunfish in downstream portion of pool. Did not see any smallmouth bass, only quillback and carp. The wind picked up making observation

poor. Walking back to canoe noted another school of quillback. Again plenty of them in this pool as well.

0910h, Middle Upper, water temperature, 26.5°C, water clarity was very good. Saw a few smallmouth and shiners immediately. Wind has let up and we can now see the bottom of the pool. Spotted half a dozen, 12 in – 18 in, carp; 4 or 5, 9 in – 10 in bass, (could not distinguish species, but definitely a black bass). No sunfish or nests observed in this pool.

Survey 10---2 August- SA, CA- 10th and final survey, 0730h Bridge Pool. Bright sunny day; water level was lower than last week. Flow is down to a minimal trickle, nothing like it has been; some time since last rain. Water clarity is fairly clear. Some turbidity due to possible algae blooming. Wind is minimal making water still. Temperature 21°C. Plenty of crayfish but few fish. Walked almost halfway down pool before we saw our first fish; one smallmouth bass ranging between 2 – 3 inches in length, no visible signs of fungus/bacteria sore. Small, adjacent pool east of main Bridge Pool, water temperatures were much higher at 26.5°C, but no fish seen here either. As we made our way upstream to start location under bridge, we saw two very large schools of fish. The first school was gizzard shad, at least 75-100, all 2– 3 in long. The second school consisted of 2-in quillback, approximately 25-30. Only one smallmouth total for Bridge Pool. The average depth was 2.5 feet.

0820h West Pool. Water temperature 27.5°C, little wind. Water clarity was poor. Again algae bloom making viewing of deeper waters difficult. Lots of activity noted. Many schools of quillback in the 3-in range. Large carp (4-5), 15 – 18 inches long swirling around the canoe. A green sunfish, 4 – 5 inches long was spotted near a large rock and gravel area. After further observation, fish looks like he/she is guarding a nest. We stopped and watched the fish moving back and forth, flared up, and definitely guarding an area under a large rock. We believe this was definitely a fish guarding a nest. Next spotted a smallmouth bass 10 in – 12 inches in long. Canoeed over one very large school of gizzard shad, numbering at least 50, all about 2 inches long. Further around perimeter noted more 3 in – 4.5 inches long sunfish (likely bluegill) swimming around but none of them guarding a nest. Noticed fewer crayfish here in West Pool, probably due to more predators.

0845h Middle Pool. As we walked toward Middle Pool we noticed 2 – 2.5in smallmouth bass. Water level is low, water temperature is 26°C and water clarity is clear and little wind making visibility good. Saw a sunfish dart quickly past, hard to identify. Noticed single smallmouth bass scattered within this pool, all 2 – 3 inches long with no visible signs of fungus/bacteria or sores. Deepest part here is 2 – 3 ft. Not much cover. This could be the reason we have seen the fewest fish here. After about 30 min of searching we moved to the next pool.

0930h Upper Middle Pool. Water temperature 26.5°C, water clarity less than last week. Algae bloom here also, limiting viewing to shore line. Noticed several 10 – 15-in smallmouth bass scurrying around. Plenty of large carp here in this pool as always. Noticed on south perimeter of pool, a very large school of small, silver, “streamlined” fish, approximately 100, about ¼ inch long (YOY). We netted and examined several, and believe they are a species of shiner but really too small to identify. Also noticed several small bluegill, 1-inch long (YOY) hanging around a very large boulder. They were too deep to net, so we let them alone, but did not see a larger fish guarding them. Further along south perimeter noticed several largemouth bass, 10– 12 inches long, and also several very large carp. Unfortunately, due to algae growth, we could not see the bottom of the pool where last week we saw a majority of fish in Upper Middle Pool.

Did not see any signs of fungus/bacterial growth on fish in any of the pools. The fungus could have run its course and the infected fish could have already perished. No signs of dead fish, possibly due to decay and/or predation. **END OF SURVEY**

Holtwood Spillway-spill history for spawning survey duration

July 8 2100-2200h—1,000-1,500 cfs estimated

July 9 0100-0200h---1,000-1,500 cfs, estimated

July 17 2200-2300h---<1,000 cfs estimated

July 21 2000-2300h---1,000-1,500 cfs estimated

Note –should get river flow records (Marietta or Holtwood inflow) for period bracketing these weekly trips (May 31 through August 2).