

THE PHENOLOGY OF COLONIAL CREEK
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Phenology is defined as a branch of biological sciences concerned with the timing of natural events in plants and animals from year to year and from place to place, and their relationships to season, weather, and climate. Nature centers and parks regularly use phenological events in their interpretive activities. These include keeping annual species lists that record the first sightings of migratory birds and blooming wildflowers. Some species such as the famed swallows of San Juan Capistrano in California are so habitual in their migration schedules that they usually arrive on the same date each year.

Unfortunately, with the exception of the spectacular spawning migrations of salmon and a few other species, native fishes largely slip through the seasons unnoticed. For years, I had been intrigued by changes occurring in the same stretches of stream where I would sporadically collect from spring to fall. Species collected in large numbers during the spring would be absent in the fall, and with other species the reverse would be true.

The puzzle became even more perplexing one spring while collecting Rainbow Darters. I found large females in abundance, but not a single male; however, when I returned in the fall, both sexes were present in roughly equal numbers. I wondered: If these events were chronologically documented, how many species would exhibit a distinct, seasonal pattern (appearance, peak, and disappearance) which could be predicted from year to year? Such information would be an invaluable guide to plan and time collecting trips.

In 1987, I decided to begin a "Pheno Log" of my own. I selected a site on Colonial Creek in Dakota County, Minnesota. Barely two miles in length from its source in Mendota Heights to its confluence with the Mississippi River, Colonial Creek begins in a series of marshes and beaver ponds. About half-way down its course, the meandering stream increases in gradient and plunges through a limestone canyon before passing under County Road 45 in Lilydale.

The stream emerges from a culvert into a cement-walled pool approximately 30' long, 10' wide, and 2' deep with a bottom composed of sand. The pool acts as a staging area where large numbers of fish congregate in their upstream migration. The dimensions of the pool and bottom type provide for easy, thorough, and often productive seining. Due to an unusually mild winter with little snow, I was able to begin surveying the pool in March and continued into November. In April and May, I began surveying the pool weekly to minimize the chances of missing a species or a peak; however, I eventually settled into a simpler biweekly schedule.

The results have been compiled into the following tables.

TABLE I. SPECIES TIME LINES

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Central Mudminnow (MUD)		---	---	---	---				
Common Carp (CAP)					-	---			
Northern Redbelly Dace (NRD)		--	---	---	---				
Fathead Minnow (FHM)	---	---	---	---	---				
Blacknose Dace (BND)	---	---	---	---	---	---			
Creek Chub (CRC)	-	---	---	---	---	---	---		
White Sucker (WHS)					-	---	---	---	---
Black Bullhead (BLB)		--	---	---	---	---	---	---	---
Brook Stickleback (BSB)	---	---	---	---	---	---	---	---	---
Green Sunfish (GSF)		---	---	---	---	---	---	---	---
Pumpkinseed (PKS)						---	---	---	---
Bluegill (BLG)					-	---	---	---	---
Largemouth Bass (LMB)					-	---	---	---	---

TABLE II. SPECIES TOTALS, DIVERSITY, AND WATER TEMPERATURES

	MUD	CAP	NRD	FHM	BND	CRC	WHS	BLB	BSB	GSF	PKS	BLG	LMB	SUM	SD	F
03/02				3	1				4					8	3	32
03/31				2	1	1			22	1				27	5	35
04/07	1			6	16				72	2				97	5	47
04/13				9	14	1			75	8				107	5	46
04/20	3		1	30	204			1	140	26				405	7	57
04/27			1	63	20			23	38	50				195	6	49
05/04			2	30	41	1		7	35	54				170	7	44
05/11	2		2	33	153	3		9	58	65				325	8	56
05/24			2	25	252	1		3	34	66				383	7	51
06/05			1	27	248	1		8	25	65				375	7	54
06/20			2	26	194	1		11	15	65				314	7	60
07/02	9		1	25	107	2		42	5	64				255	7	60
07/17	4		1	23	136	3	1	1	13	63				245	9	63
07/23	*****FLASH FLOODING FOLLOWS 14 INCH RAINFALL*****															
07/31		1		6	5			6		1		4	1	24	7	87
08/15		5			2	1		11		122	44	91	34	310	8	76
08/28		2				2		11		112	62	162	36	387	7	67
09/12						1		10	1	26	31	54	11	134	7	58
09/25						4	1	1		78	42	49	14	189	7	54
10/10								1		42	29	26	4	102	6	48
10/24										65	38	37	4	144	4	46
11/12							1			100	33	38	8	180	5	45
SEASON																
TOTALS	19	8	13	308	1394	22	3	145	537	1075	279	461	112	4376	13	

Table I., Species Time Lines, provides an overview of the periods when each species was present in the pool. Fathead Minnows, Blacknose Dace, and Brook Stickleback were the first species present in March when a thin sheet of ice still covered the pool. All were thin, lacked any hint of spawning

colors, and had difficulty maintaining their equilibrium. The Creek Chub showed up the end of March and was followed in April by the Central Mudminnow, Northern Redbelly Dace, Black Bullhead, and Green Sunfish. Colors and physical condition improved dramatically in April. Pronounced tubercles developed on the Fathead Minnow and Creek Chub making the latter difficult and unpleasant to handle. Brook Sticklebacks became velvety black, and Blacknose Dace developed a crimson band on their sides. The time lines show a definite disappearance for most of these early season species; however, Green Sunfish and late season arrivals (White Sucker, Pumpkinseed, Bluegill, and Largemouth Bass) were still present in November at the time of the last survey.

Table II, Species Totals, Diversity, and Water Temperatures, provides the same information in greater detail. Three letter codes provided in the first table (e.g., Central Mudminnow = MUD) list the individual species subtotals and SUM is the total number of all fish collected on that date. SD (species diversity) lists the number of species present and F is the Fahrenheit water temperature. Overall, I surveyed the pool 21 times and handled 4,376 fish (Yes, I counted every one). The most abundant species were Blacknose Dace at 1,394 and Green Sunfish at 1,075. Eight of the 13 species had at least one pronounced peak, and though small numbers were collected in the remaining five species, only the White Sucker showed a "flat line." Fathead Minnow, Blacknose Dace, Black Bullhead, and Brook Stickleback share peaks within one week (April 20-27), and Green Sunfish, Pumpkinseed, Bluegill, and Largemouth Bass within two weeks (August 15-28). Species total numbers (SUM) first peaked on April 20 at 405 and was composed mostly of Blacknose Dace and Brook Stickleback; however, another peak at 387 on August 28 was primarily Green Sunfish and Bluegill. Species diversity (SD) peaked on July 17 at 9 with a water temperature of 63°F.

The most interesting event occurred on July 23 when a severe thunderstorm dumped 14" inches of rain in a five-hour period. When I arrived to survey the pool on July 31, the entire valley had been drastically altered. Numerous landslides streaked the hillsides. Flash-flooding had scoured the bed and banks of trees and soil, leaving a barren, rubble substrate and severely eroding cliff-like banks. A week had passed since the storm, yet the normally small, silent stream still roared with ebbing floodwaters. Amazingly, the water ran crystal-clear, but noticeably warm at a season record of 87 degrees. Swift currents made seining the pool's last few feet difficult but adequate, and yielded a total of only 24 fish. Most species present before the storm had either crashed in numbers or disappeared. Carp, Bluegill, and Largemouth Bass made their first appearance; the Pumpkinseed followed two weeks later. Centrarchid (sunfish) numbers exploded and dominated the pool for the rest of the season.

Predictions based on only one season's observation must be general and flexible at their best. Accuracy should improve when additional seasonal patterns can be compared from year to year. I do believe the early season species will follow similar patterns; however, a more normal winter than last year would produce considerably more snow and sub-zero temperatures which will likely postpone appearances into mid-April and May. Unfortunately, I cannot even hazard a guess when or if the late season species will make an appearance without a summer flood. Time will tell.
