



Fish Community status at Homestead National Monument of America 2004-2015

Fish communities are often used as biological indicators of stream health. Long-term monitoring of these communities allows scientists to observe and analyze trends in community structure as well as changes or shifts in stream habitat complexity and water quality. Land use around Homestead National Monument of America (HOME) affects the water quality of Cub Creek and therefore affects the fish communities that are able to exist within the stream. Continued monitoring of Cub Creek as well as working with surrounding land owners may help increase water quality and provide better habitat for fish communities within the park.

The purpose of fish community monitoring in Homestead National Monument of America is to determine the status and long-term trends in fish diversity, abundance, and community composition and relate this data to overall water quality and stream habitat condition. By using scientifically sound monitoring data, park managers are better able to manage and protect streams within their parks.



Figure 1. Cub Creek at Homestead National Monument of America

Methods:

For specific details on methods of site selection, fish sampling, habitat and water quality data collection, and data analysis see Dodd et al. (2008) and Dodd and Cribbs (2012).

- Fish communities were sampled at Cub Creek (Figure 1) near the downstream park boundary in summer of 2004, 2006, 2008, 2011 and 2015.

- Fish were collected using a common sense seine. Fish were identified to species, measured, and inspected for disease or abnormalities prior to their release.
- Stream habitat data related to channel morphology and fish cover and bank/riparian conditions were collected in conjunction with fish sampling.
- Water quality characteristics (temperature, dissolved oxygen, pH, specific conductance, and turbidity) were also collected at Cub Creek over a 24 hour period using a calibrated water quality data logger.
- Fish community diversity, abundance, composition, and overall stream integrity (Index of Biotic Integrity or IBI) was assessed within the park.

Summary of Findings:

- A total of twenty species were captured across the five years of sampling (Table 1), with the greatest species richness collected in 2015 (Figure 2). Three new species (Redfin Shiner, Tadpole Madtom and White Crappie) were collected in Cub Creek in 2015. This may be associated with the high flows and flooding that occurred in early spring within the Big Blue River watershed (Figure 3), allowing fish from other streams and adjacent ponds access to Cub Creek.

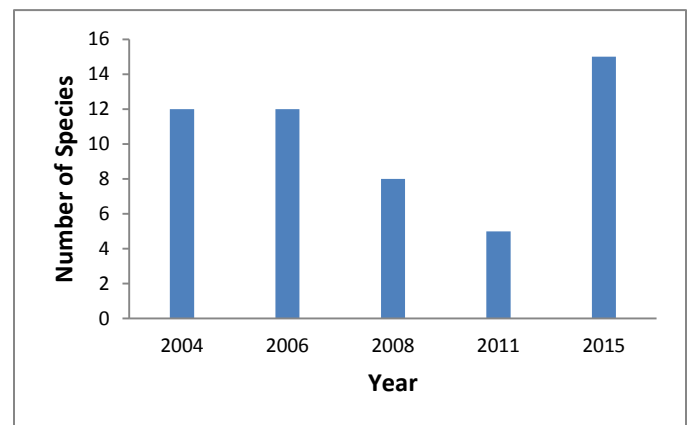


Figure 2. Species richness in Cub Creek within HOME.

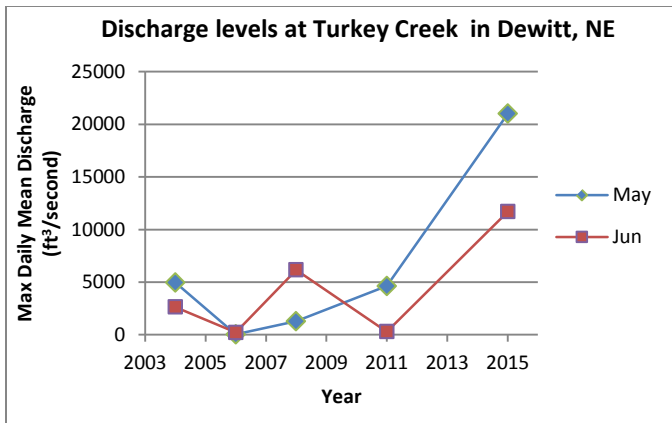


Figure 3. Discharge levels at Turkey Creek, a tributary of the Big Blue River, near Cub Creek. Data obtained from USGS gage 06881380 (USGS 2016)

- Community diversity, which ranges from 0 to 1, was relatively low in 2004 and 2008 (0.34 and 0.43), due to dominance of the community by Red Shiners (80% and 74% of the community). However, communities in 2006, 2011 and 2015 were moderately diverse (0.57, 0.62 and 0.61).
- Overall, stream integrity was rated as fair in all years (Figure 4). A fair rating defines a stream that is dominated by, 1) species tolerant to poor water quality and habitat conditions, 2) generalist feeders, and 3) a few abundant species. Cub Creek was dominated by Red Shiner, Sand Shiner, Fathead Minnow and Channel Catfish (all tolerant or moderately tolerant species). However, IBI scores increased from 35 in 2004 to 40. An IBI score of 41 or greater indicates good stream integrity.

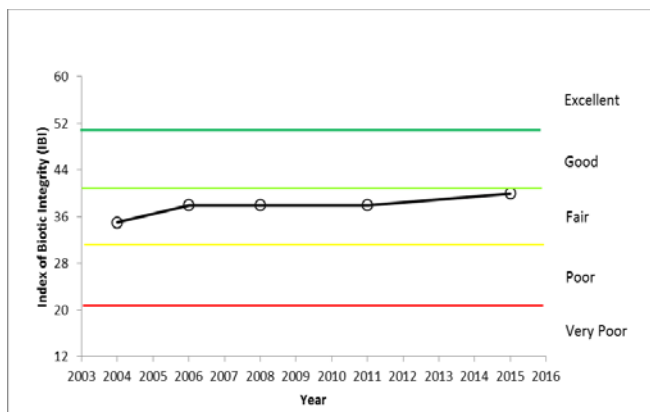


Figure 4. Index of Biotic Integrity (IBI) for fish communities sampled in Cub Creek within the park. Horizontal lines represent stream quality ratings for IBI scores.

- Water quality conditions in Cub Creek were within Nebraska Department of Environmental Quality standards (NDEQ 2009). Data collected in 2015 had the highest average specific conductance reading (634.47 $\mu\text{S}/\text{cm}$), temperature (24.65 $^{\circ}\text{C}$) and percent muck substrate (66.5%) during the five years of monitoring, which may be associated with flooding of the creek and the deposition of large amounts of sediment into the system.

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Table 1. Fish species collected in Cub Creek in 2004, 2006, 2008, 2011 and 2015.

Common name	Scientific name	2004	2006	2008	2011	2015
Bluegill	<i>Lepomis macrochirus</i>	3	3	2	0	4
Bluntnose minnow	<i>Pimephales notatus</i>	1	0	0	0	0
Central stoneroller	<i>Campostoma anomalum</i>	3	0	0	0	0
Channel catfish	<i>Ictalurus punctatus</i>	37	7	11	13	22
Common carp	<i>Cyprinus carpio</i>	0	0	0	0	4
Creek chub	<i>Semotilus atromaculatus</i>	4	8	1	0	1
Fathead minnow	<i>Pimephales promelas</i>	31	21	0	11	39
Gizzard shad	<i>Dorosoma cepedianum</i>	0	0	2	0	9
Green sunfish	<i>Lepomis cyanellus</i>	15	2	0	0	8
Largemouth bass	<i>Micropterus salmoides</i>	0	1	0	0	1
Non-carp minnow spp.	<i>Cyprinidae spp.</i>	0	2	0	73	13
Red shiner	<i>Cyprinella lutrensis</i>	668	313	102	195	358
Redfin Shiner	<i>Lythrurus umbratilis</i>	0	0	0	0	1
River carpsucker	<i>Carpionodes carpio</i>	0	1	1	0	0
Sand shiner	<i>Notropis stramineus</i>	57	136	16	331	168
Stonecat	<i>Noturus flavus</i>	6	10	0	0	0
Suckermouth minnow	<i>Phenacobius mirabilis</i>	4	17	2	1	1
Tadpole madtom	<i>Noturus gyrinus</i>	0	0	0	0	1
White crappie	<i>Pomoxis annularis</i>	0	0	0	0	1
Yellow bullhead	<i>Ameiurus natalis</i>	1	1	0	0	3

Citations:

Dodd, H. R., D. G. Peitz, G. A. Rowell, D. E. Bowles, and L. M. Morrison. 2008. Protocol for monitoring fish communities in small streams in the Heartland Inventory and Monitoring Network. Natural Resource Report NPS/HTLN/NRR—2008/052. National Park Service, Fort Collins, Colorado.

Dodd, H.R. and J.T. Cribbs. 2012. Fish community monitoring at Homestead National Monument of America: 2004-2011 status report. Natural Resource Data Series NPS/HTLN/NRDS—2012/276. National Park Service, Fort Collins, Colorado.

Nebraska Department of Environmental Quality (NDEQ). 2009. Nebraska Administrative Code Title 117, Chapter 4 – standards for water quality.

United States Geological Survey (USGS). 2016. USGS current water data for Turkey Creek, near DeWitt, Nebraska.
http://waterdata.usgs.gov/ne/nwis/uv?site_no=06881380 Accessed: May 9, 2016