AMERICAN DIPPER SURVEY ALONG BEAR CREEK

JEFFERSON, CLEAR CREEK, and ARAPAHOE COUNTIES, COLORADO DECEMBER 2020-AUGUST 2021



Photos by D. McKenna & H. Johnson (2021)

EVERGREEN AUDUBON DIPPER SURVEY TEAM DECEMBER 2021



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From December 2020 through August 2021, 30 Evergreen Audubon and other community members conducted a survey for American Dippers along Bear Creek which began as a pilot study during the summer of 2019. The purpose of the expanded survey was to determine the winter distribution, abundance, and breeding status of this fascinating aquatic songbird in the Bear Creek watershed. To our knowledge, no prior comprehensive survey had been conducted along the entire creek.

The presence and successful breeding of dippers is known to be an excellent indictor of good stream health (Malone, 2014). Our survey results would provide baseline data to evaluate future changes in dipper density and productivity which could transpire due to drought, flooding, wildfires, pollution or other damaging events in the watershed should they occur.

STUDY AREA

We divided the main stem of Bear Creek into 11 survey areas that we identified as reaches, which extended from 9,000 feet elevation at the western boundary of the Mount Evans State Wildlife Area (SWA) downstream to 5,300 feet at the confluence with the South Platte River. Volunteers, either individually or as part of a small team, were assigned a reach for both winter and breeding surveys. For the winter surveys, reaches 1 to 9 were established from Evergreen Lake downstream to the South Platte confluence. For the breeding season, and as the creek ice thawed, reaches 10 and 11 were established from Evergreen Lake upstream past Singing River Ranch and through the Mount Evans SWA (Figure 1, Table 1).

Extensive sections of Bear Creek are bordered by private property and we were fortunate to receive permission from several homeowners to survey stream reaches along their properties. However, due to lack of other landowner's permission or other access restrictions, certain sections of the creek were not accessible. However, many private stretches of the Creek were at least partially visible from adjacent roadways and trails. Because of access issues, our surveys covered about 23.2 miles of the total creek length of 35.5 miles within the survey area.



Figure 1. Approximate location of Bear Creek AMDI survey area.

able 1. /	American Dipper survey reaches along Bear Cr	еек 2020-2021.	
Reach	Location	Length (miles)	Length surveyed
1	Evergreen Lake Dam to Meadow Drive	0.6	0.6
2	Meadow Drive to Troublesome Gulch	1.8	1.4
3	Troublesome Gulch to Cold Spring Gulch	2.8	2.8
4	Cold Spring Gulch to Lair o' the Bear Parking lot	1.2	1.2
5	Lair O' the Bear Parking lot to Little Park	1.4	1.3
6	Little Park to Denver Mountain Parks Headquarters	3.5	3.4
7	Denver Mountain Park Headquarters to E470 Bridge	2.0	2.0
8	E470 Bridge to Bear Creek Lake	1.9	1.9
9	Bear Creek Lake Dam the to the South Platte River	7.2	1.8
10	Singing River to Evergreen Lake	6.5	3.6
11	Upstream of Singing River Ranch	6.6	3.3
	Total Milage	35.5	23.2

reaches along Rear Crook 2020 2021

SURVEY METHODS

From December 2020 through March 2021, we conducted intensive winter surveys along 16.3 miles of the main stem of Bear Creek from Evergreen Lake downstream to the confluence with the Platte River. A total of 21 volunteers spent about 160 hours during the four months counting and mapping wintering dippers and recording data on behavior and stream conditions including ice coverage, turbidity, and human disturbance. During the winter we occasionally surveyed the creek upstream of Evergreen Lake to confirm that it was mostly frozen, snow covered, and unsuitable for wintering dippers. Presence of dippers along Bear Creek depended to some extent on the amount of open water. During surveys, ice and snow coverage ranged from "Open" to "Frozen" with most areas usually "Partly Open".

In late March we started breeding surveys along Reaches 1-9 of 28.9 miles of the Creek from the Singing River Ranch downstream to the Platte River. Surveys along Reach 11 upstream of Singing River started in Late May. A total of 30 volunteers spent 212 hours searching for and monitoring nests. They mapped and described nest locations, and recorded dates of nest building, incubation, feeding nestlings, and fledging. Attempts were made to count nestlings and fledglings, when possible, to ascertain nest success and productivity.

RESULTS

Winter Surveys

Below Evergreen Lake, the amount of ice peaked in February and the Creek was mostly ice-free with increasing stream flow in March. Surveyors found wintering dippers along Reaches 1-6 each month from December through March. The most upstream areas of Reach 2 were open even in February as a result, at least in part, of outflows from Evergreen Metro's treatment facility and tailwaters from Evergreen Lake Dam, which may contribute to the high density of dippers observed there (Figure 2, Table 2).



Figure 2. Winter density (individuals/mile) compared to nest density (nests/mile) of American Dippers along designated reaches (separated by diamonds) of Bear Creek, Colorado, surveyed for American Dipper between December 2020 and July 2021. Nest density values (March - July) above the bar, winter density below (December - February).

	Miles	December		January		February		March		Average	Standard	
Reach	Surveyed	no.	den.	no.	den.	no.	den.	no.	den.	(den.)	Deviation	CV ²
1	0.6	1	1.67	1	1.67	2	3.33	2	3.33	2.50	0.96	0.38
2	1.4	4	2.86	5	3.57	12	8.57	9	6.43	5.36	2.64	0.49
3	2.7	4	1.48	8	2.96	6	2.22	13	4.81	2.87	1.43	0.50
4	1.2	5	4.17	5	4.17	5	4.17	4	3.33	3.96	0.42	0.11
5	1.3	4	3.08	5	3.85	2	1.54	4	3.08	2.88	0.97	0.34
6	3.4	8	2.35	9	2.65	5	1.47	6	1.76	2.06	0.54	0.26
7	2.0	0	0.00	9	4.50	6	3.00	3	1.50	2.25	1.94	0.86
8	1.9	1	0.53	0	0.00	0	0.00	0	0.00	0.13	0.26	2.00
9	1.8	0	0.00	1	0.56	1	0.56	1	0.56	0.42	0.28	0.67
10 ¹	3.3	0	0.00	0	0.00	0	0.00	3	0.83	0.23	0.45	2.00
1-7	12.6	26	2.06	42	3.33	38	3.02	41	3.25	2.92	0.58	0.20
1-10	19.9	27	1.36	43	2.12	39	1.99	45	2.26	1.93	0.41	0.21

Table 2. Numbers (no.), densities (den.), and variation (Standard Deviation, CV) of American Dippers detected from December 2020 to March 2021 along reaches of Bear Creek, Colorado.

¹ Snow covered through February. ² CV = Coefficient of Variation (Average/Standard Deviation)

Reach 10, upstream of Evergreen Lake, remained completely frozen until March. Dippers were observed in areas that were mostly frozen or even frozen and were able to forage through small openings in the ice. Below Evergreen Lake the amount of ice peaked in February and the stream was mostly ice-free with increasing stream flow in March. The Creek was flowing below average until May.

Further downstream, dippers were first detected in Reach 7 (Morrison) in January. The only dipper found in Reach 8 (Bear Creek Lake Park) was in December. Along the extensive Reach 9 below Bear Creek Lake, volunteers saw one dipper each month from January through March. The farthest downstream dipper observed was foraging 0.78 mile from the South Platte River on 19 February.

Dippers were not observed upstream of Evergreen Lake until 20-21 March when ice and snow completely covering the stream had finally thawed enough for there to be open water. Dippers were not seen in Reach 11 until July.

Total number of Dippers each month increased from 27 individuals in December to 45 in March. This increase could be a function of observer familiarity with their reach. The average dipper density (dippers/mile) ranged from 0.0 to 8.6 per mile with the highest density in February observed in Reach 2. The monthly totals for the key wintering dipper area between Evergreen Lake and Morrison (Reaches 1-7) ranged from 26 individuals in December to 41 in March with average dipper density for the four months at 2.9 dippers/mile. Overall, Reach 2 (downstream of Evergreen to Kittredge) had the highest average dipper density (5.4 dippers/mile). Except for one reach (4), variation among months in the density of dippers for the entire study area was much lower than the variation within a reach.

The dipper densities observed in Bear Creek were comparable to those observed in other streams. For example, Price and Bock (1983) studies in Boulder Creek found wintering dipper densities range from 1.6 to 6.3 birds/mile. In western Montana prebreeding densities averaged 2.1 birds/mile (Bakus, 1959).

Breeding Surveys

Our surveyors found and monitored a total of 29 nest sites between Singing River Ranch and Morrison (Table 3). Of those nests, 18 were placed under highway or driveway bridges, 5 in drainage holes, 3 under footbridges, 1 on rock outcrops, 1 under a fishing platform, and 1 unknown. Figure 3 shows the approximate location of nests and their outcomes.



Figure 3. Nest locations of American Dippers along Bear Creek, Colorado, surveyed between March and July 2021. Symbols indicated nest stage completed by pairs: NB = nest building, EG = eggs laid, CK = chicks fed in nest, FL = fledged chicks. Asterisk indicates second nest at same location.

Dippers started to sing, show territorial behavior and form obvious pairs in February, and nest building was first observed in mid-March and continued through 31 May (Table 3). Adults feeding young were first observed on 6 May and continued until 21 June (Table 3). The first nestling was recorded on 6 May in Lair O' the Bear Park (Reach 5), and the latest observed fledging on 21 July 21 in Morrison (Reach 7) likely from a second brood. Of 28 nests where the outcome was known, 15 (53.6%) successfully hatched young. Fledglings often dispersed away from the nest site after two to four days; if surveyors did not visit the site within that time, fledglings may not have been located. From the 15 successful nests, we estimate that a minimum of 35 fledglings were produced (Table 3). From sites where we were certain of the number of chicks fledged (n = 11), we estimate that an average dipper pair produced three chicks.

Several nests were abandoned following nest building and initial incubation observed in late April and early May. Abandonment of some nests may have resulted from sudden increases in the stream flows. Stream flows in Bear Creek were running below average in March and April then with frequent heavy rain and snow in the watershed flows increased to above average (Figure 4). The snowpack at higher elevations started melting rapidly in mid-May two weeks later than average. This contributed to significant spikes and several above-average flows through the end of May. The USGS gauge above Evergreen Lake spiked at 198 cubic feet/second (cfs) on 23 May compared to the median 69 cfs; the gauge below Morrison spiked at 279 cfs on 17 May compared to the median of 75 cfs.

A nesting platform placed under the Independence Trail bridge in Reach 1 was washed away sometime before 28 May but it was not known if a nest was built. Another nesting platform installed in the same reach under the Highland Haven bridge on 18 April had a nest built by dippers soon after placement. Although nestlings were heard, the nest was abandoned, in late May, probably as a result of high stream flows on 23 May.

While American Dippers have been recorded breeding as high as 10,000 feet in Colorado, the highest nest surveyors found along Bear Creek was at 7,620 feet at Singing River Ranch. In 2021, surveyors searched for dipper nest sites along the higher reaches of Bear Creek in the Mount Evans SWA. Between 1 June and 28 July, surveyors made 15 trips into various parts of a six-mile portion of Bear Creek extending above Singing River Ranch to the vicinity of Camp Rock in Mount Evans SWA at about 8,900 feet. Only two observations of dippers were made: a single bird on 8 July between Grass and Lost Creeks in Mount Evans SWA and a lone adult dipper on 14 July just below the confluence of Indian Creek, where an adult pair was observed on 15 July 2020. No other dippers were encountered, although droppings on midstream rocks were observed.



Figure 4. Flow rates of Bear Creek, Colorado during the 2021 AMDI nesting season.

Table 3. Summary of AMDI nests monitored along Upper Bear Creek, March-July 2021.

Location	Reach	Substrate	Elev. ft	Date Build*	Date Incubate*	Date Feeding*	Date Fledged*	Nestlings observed	Fledglings	Success	Comments * Date of 1 st observation (2021)
Singing River Rd	10	Private Bridge	7620	5/7	6/3	6/30	7/7-9	Unk	4	Y	Same site as 2 previous successful years.
Golden Willow Rd	10	County Bridge	7450	5/7	6/23/21					N	Possible 2 nesting attempts and predation by Steller Jays. Success in 2 previous years
Dedisse Park	10	County Bridge	7130	4/26	5/20	5/29	6/22-23	5	5	Y	Nesting site used in many previous years. AMDIs tolerate heavy human disturbance
Highland Haven	1	Private Bridge	7050	4/18		5/18?				N	Nest built on artificial nesting platform then abandoned. Chirping heard on 5/18
Independence Tr.	1	County Bridge	7035							N	Artificial nesting platform placed on 4/15/21 was flooded and removed by high flows.
Old Gulch Rd	2	Private Bridge	7030	4/3	5/1	5/17	6/5-6	4	3-4	Y	Fledglings moved upstream the next day then disappeared.
Two Barns Rd.	2	Private Bridge	7020	4/8						N	No activity after 5/7. Apparently abandoned possibly by high flows
Stone Cottage	2	Private Bridge	7015	4/23						N	No activity observed after 4/23. Apparently abandoned possibly by high flows
Goldrick	2	Private Bridge	7010	4/23						N	No activity observed after 5/17. Possibly abandoned by high flows.
Welch St.	3	County Bridge	6850	4/11	4/30					N	Apparently abandoned after 4/30. Nest site successful in 2020
Avenue F, Kittredge	3	County Bridge	6840	4/19/21						N	Abandoned after 4/19
Myers Rd. Kittredge	3	County Bridge	6830		5/9	5/16	5/16 -27?	3	0-3	Unk	"Probably success". Nest in good shape on 5/16
O'Fallon Park	3	Rock outcrop	6810	4/11						N	Abandoned after 4/11. Heavy recreational use.
Corwina TH	3	Footbridge	6760	4/11	5/27	6/15	6/23-25	2	2	Y	Heavy recreation use.
Panoramic Pt. TH	3	Old Highway Bridge	6750	5/9						N	Apparently abandoned, recreational use.
Lair O' The Bear Upstr.	5	Fishing Platform	6570	4/12	4/26	5/13	Unk	Unk	unk	Unk	No dippers seen or heard after 6/7. Nestlings may have been heard on 6/7
Lair O' The Bear Downstream	5	Goldfinch Footbridge	6520		4/20-21	5/6	5/24	Unk	3	Y	One fledgling seen on 5/24. Chicks still in the nest. 3 Juveniles seen 500' downstr. On 6/21.
Lair O' The Bear Downstream #2	5	Goldfinch Footbridge	6520			6/21		2+	0-2+	Unk	2 nd brood at site. No observations after 7/15
Idledale West	6	Private Bridge	6460	4/4	5/23	6/6	6/25	3	3	Y	Possible mink predation on 2 Fledglings
Private Rd.	6	Unk	6370				6/6		3	Y	Unknown nest location
West GOEA Wall	6	Drainage hole in wall	8280			6/6				Unk	No activity after 6/18
East GOEA Wall	6	Drainage hole in wall	6220	3/20	5/9	6/6				Unk	No activity after 6/18
Old Bridge Wall	6	Drainage hole in wall	6170		5/23					N	No activity after 6/6
East Wall	6	Drainage hole in wall	6090	4/4		6/18	7/8		1+	Y	Only 1 fledgling observed, possibly more
Waterpipe Wall	6	Drainage hole in wall	6060	4/4						N	No activity after 4/4
DMP/Union St.	7	County Bridge	5840	4/3	5/31	6/2	6/21		1+	Y	
Canon St.	7	Pipe under Bridge	5800	5/8		5/23	6/2	3	3	Y	
Canon St. #2	7	Pipe under Bridge	5800	5/8	6/21		7/21		3	Y	2 nd brood from nest site
Park Ave	7	Unk	5790				6/2/21		3		Unknown nest site
Soda Lakes Rd	7	County Bridge	5750	5/31	6/9	6/21	7/1	2	1	Y	More could have fledged earlier

Discussion

Several nests were used by dippers in previous years. Six of the 2021 nests were monitored during pilot studies the two previous seasons. Of these, three nests were successful in all three years, two were successful in 2020 but not in 2021, and one was successful in 2021 but had an unknown outcome in 2020. Since surveys were not conducted in previous years downstream of Welch Ave in Kittredge, the status of those nests in previous years is unknown

American Dippers appear to tolerate, and have been habituated to, regular and sustained human disturbance at several nest sites and within foraging territories. Recreation use has likely increased along Bear Creek over the past two years due to Covid-19. Observers documented activities such as fishing, wading, picnicking and children throwing rocks adjacent to several nest sites and foraging areas without causing the adult dippers to abandon the sites. It has been documented that wildlife in general can habituate to such disturbances if the activity is regular and predictable (Marion, 2019). For nesting birds, the more effort the adults have committed to the nest, the less likely they will abandon it. Abandonment from disturbance is more likely to occur early in the nesting cycle such as with nest building. However, we suspect that once fledging has occurred, the fledglings and adults may leave the nesting territory earlier than normal within disturbed areas. This was demonstrated a few times when the adults were seen feeding fledglings at a considerable distance from the nest site after two to three days from fledging. It may also explain why dippers were sometimes not seen after the predicted fledging date.

No direct nest predation was observed during the survey. However, observers did note Steller Jays (a known nest predator) regularly visiting an area just below and in full view of the exposed nest underneath a bridge, where a pair built and abandoned twice. We also suspect that a mink may have depredated two recently fledged chicks below Idledale.

Although we estimated a minimum breeding population of 21pairs along Bear Creek, there are stream reaches through private property with suitable nest sites where dippers were observed, but potential nest sites could not be searched. From our surveys of higher elevation reaches of Bear Creek, we conclude that the presence of dippers in the upper reaches in July is probably post-breeding dispersal upstream. No birds were ever heard singing, and there were never any signs of breeding or nesting behavior. Hence, until we get evidence to the contrary, we conclude that the birds nesting at Singing River Ranch (7,620 feet) represent the highest breeding effort along Bear Creek.

Adult dippers were efficient in finding, catching, and bringing aquatic insects to the nestlings. We often observed them bringing many bill-fulls of insects to the nest within a surprisingly short period of time. This was evidence that a healthy stream with good water quality and abundant macroinvertebrates are necessary to maintain a dipper population.

Since 2004, the Bear Creek Watershed Association has conducted macroinvertebrate sampling and data collection at up to 14 sites along the mainstem of Bear Creek. Sites within our dipper survey area including Lair o' the Bear Park, Bear Creek Cabins, Main Street Evergreen (across from the Little Bear), Dedisse Park above Evergreen Lake, Golden Willow Bridge, and within the Mt Evans SWA. The Association performed sampling in August 2019 but unfortunately not in 2020 because of low flows. The 2019 survey showed "impairment" of macroinvertebrates at the Evergreen Main Street site potentially caused by parking lot sealing operations that were undertaken just prior to the August sampling. The highest diversity and abundance were found at a site in Mt Evans SWA which could support an upstream movement of dippers later in the season.

SUMMARY

Our survey of American Dippers found up to 43 wintering individuals and a viable breeding population in a 19-mile section of Bear Creek-between Morrison and Singing River Ranch. This should provide baseline data to support future surveys that could measure potential changes in the winter distribution and abundance, as well as nesting success during the breeding season. Because of the documented decline in North American birds, including the American Dipper, it is important to monitor breeding birds and develop conservation measures to protect vulnerable populations (Rosenburg et.al, 2019). We recommend that dipper surveys be repeated at least every five years or more often in the event of significant drought related low stream flows, wildfires, and heavy sedimentation.

The status of American Dippers breeding upstream of Singing River Ranch remains uncertain. The habitat appears to be highly suitable and the prey base substantial. What is missing is the abundance of bridges that occur at lower elevations and perhaps ice-free flows at the start of breeding. However, dippers have nested successfully on streamside cliffs in other high-elevation streams without the array of bridges. This year was an unusual breeding season for several local bird species whose numbers were down dramatically (Suddjian, 2021). As with these other birds, Dippers may have been affected by the cumulative effects of regional wildfires, toxic gases, drought, reduced food resources, extreme weather events and other possible factors that have occurred over the past few years. If habitat at lower elevations becomes impacted by low flows and warmer water, the higher elevations may provide a refugium in the watershed. We recommend that dipper surveys should continue upstream in the Mount Evans SWA in 2022 with a detailed habitat evaluation and consideration of installing artificial nesting platforms that had some success downstream.

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PHOTOS FOLLOW



Photo 1. An icy February morning on Bear Creek above Morrison (H. Johnson, 2021)



Photo 2. Dipper courtship on Bear Creek near Kittredge (D. McKenna, 2021)



Photo 3. Dipper pair with nesting material on Bear Creek near Kittredge (D. McKenna, 2021)



Photo 4. Ready to feed young along Bear Creek near Kittredge (D. Baker, 2020)



Photo 5. Feeding young under Bear Creek footbridge near Lair O' the Bear Park (D. McKenna, 2021)



Photo 6. Fledgling Dipper fresh out of the nest, Upper Bear Creek (L. White, 2020)



Photo 7. Adult (right) giving young a "cold shoulder", Upper Bear Creek near Evergreen (M.Meremonte)



Photo 8. Nesting platform under bridge in Evergreen (M. Rhodes)