Wildlife Behaviors at Pinnacles National Park's Intermittent Streams

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ABSTRACT

Environmental pressures such as extended periods of drought and a rise in climatic temperatures contribute towards lower and sparser water flows of intermittent and ephemeral streams. Intermittent headwaters are highly dynamic and provide a mosaic of habitat patches which supports the biodiversity which are adapted to its inconsistent hydrologic cycle. We used passive infrared cameras to capture the behaviors of terrestrial vertebrates at the intermittent streams at Pinnacles National Park. I assessed terrestrial vertebrate biodiversity at the intermittent streams of Pinnacles National Park while identifying habitat preferences and common behaviors in response to seasonal changes. Many species interacted with the streams (n = 32) and I coded wildlife interactions into five habitat categories and ten behavioral categories. Species preferred to interact with the stream while positioned along the streambank over directly entering the streambed. I recorded traversing, which contained behaviors such as moving through the habitat while eating and drinking was recorded to be the highest level of behavioral interactions. Species interacted with the streams overall more during the dry seasons (n = 1257) and the overall frequency of visitation was 1.2 visits per day throughout all the reaches I studied. Interactions helped to highlight the frequency of which terrestrial vertebrates come into contact with intermittent streams throughout a temporal period of nine months.

KEYWORDS

non-perennial, terrestrial vertebrate, climate change, Mediterranean climate, biodiversity

INTRODUCTION

The natural flow regimes of freshwater systems are becoming more variable due to global climate change (Krasovskaia and Gottschalk 2002). This inconsistency is often referred to as intermittency, reflecting a noncontinuous surface flow. While stream intermittency is often a natural part of a watershed in certain climates, anthropogenic pressures like increased water usage and urbanization tend to exacerbate the patterns. This intermittency has the potential to alter ecological systems like food webs and nutrient cycles which could lead to the loss of species (Fierro et al. 2019). Ecosystems have no defined boundaries because there is constant flow of energy. Interconnected ecosystems subsidize each other with nutrients and predator-prey interactions (Nakano and Murakami 2001). Cross-ecosystem subsidies provide nutrient transfers which connect ecosystems into meta-ecosystems (Klemmer et al. 2020). Nutrient subsidies increase ecosystem productivity in freshwater systems and create a highly productive riparian zone (Davis et al. 2011). This exchange promotes the flow of vital nutrients between the terrestrial and aquatic ecosystems. Intermittent rivers and ephemeral streams (IRES) are widely studied throughout the world but there is a lack of emphasis when studying terrestrial vertebrates and their behavioral characteristics at non-perennial streams (Sanchez-Montoya et al. 2017).

Studying wildlife interactions can give scientists insights on the current health of a habitat (Smits and Fernie 2013). The loss of biodiversity can cause cascading effects on ecosystems (i.e., decreasing nutrient availability and higher competition). Drought impacts species richness, abundance, and composition of avian assemblages (Albright et al. 2010) while multiple biological groups can be directly affected by a loss of a predator (Antiqueira et al. 2022). Terrestrial vertebrates have unique adaptation mechanisms to survive Mediterranean climates. When stream channels dry, terrestrial and aerial vertebrates utilize the streambed to disperse; the low density of vegetation facilitates their movement (Sanchez-Montoya et al. 2022). The connectivity between habitats is crucial during a time where habitat fragmentation is increasing and analyzing how terrestrial vertebrates interact with IRES will help make more informed decisions when it comes to proper land management.

Habitat alterations due to drought not only affect the local ecosystems but neighboring ones as well (Baxter et al. 2004). Freshwater food-webs and nutrient cycles are powerful systems that help represent patterns of biodiversity and the flow of energy which show ecosystem structure, dynamics and stability (Thompson et al. 2012, Bogan and Carlson 2018). Camera traps capture full interactions with the watershed, providing visitation frequency, habitat preferences, and behavioral traits data. Collecting more data on how wildlife interact with wet and dry freshwater channels is crucial in advancing the freshwater ecology and wildlife ecology field (Bogan and Carlson 2018). A prime site that contains non-perennial streams is Pinnacles National Park, California. Pinnacles's runoff is primarily due to Pacific cold fronts November to March, and due to its hot-summer Mediterranean climate, intermittent and ephemeral streams are abundant (NPS 2019). With growing knowledge of freshwater ecosystems at Pinnacles National Park, studies that encompass the cross-section of freshwater and terrestrial ecology would benefit from observations that indicate the interactions between intermittent streams and terrestrial vertebrates.

In this study, I explored terrestrial wildlife behavior and their response to the changes in temperature and hydrology that arises with global climate change. Behavioral patterns and habitat preferences provide insight on ecosystem health and will allow for a holistic approach to conservation. In order to conduct an analysis of the interactions between the freshwater streams of Pinnacles National Park and the wildlife present, I incorporated the usage of passive infrared cameras and used a wildlife study that served as a model (Wingenroth 2019). Monitoring with cameras does not have a great extent of usage in the freshwater ecology field. Data collection addressed; how does species composition change over the course of hydrological phases, what is the frequency (daily) of terrestrial animals visiting the streams, what behaviors do the different species show when approaching the stream beds. I predicted that during the hotter seasons, there will be higher visitations from larger terrestrial vertebrates due to higher water needs. I also expected the frequency to be higher during the warmer seasons due to lower temperatures that vegetation shade provides near the streams. Finally, I believed that a common species behavior will be coming into the streambed to cool off during the warmer seasons in order to cool off. Through more studies serving as models to standardize data collection methods, there will be a comprehensive understanding of how species interact with different phases of watersheds (Rovero and Marshall 2009).

METHODS

Study area

I conducted this study in the non-perennial reaches of the Chalone Creek watershed (approx 100 km^2) (Bogan and Carlson 2018). Two tributaries apart from the Chalone Creek mainstem are observed: Sandy Creek, Bear Gulch. These streams are located in Pinnacles National Park in the Gabilán Range which is one of the Inner Coast Ranges of central California. The watershed eventually drains into the Salinas River and Monterey Bay and due the streams being controlled by fault traces and fractures, there are no regular drainage patterns. The basin's watershed is influenced by its semi-arid Mediterranean climate which constitutes a wet and dry season. The range experiences three-fourths of its rainfall within the months of December and March, and its temperature range falls between 0°C to 40°C. Its inland location causes hot, dry summers and cold, wet winters which influences the variability of stream discharge (Bogan and Carlson 2018).

The dry summer and fall months cause the watershed's flows to become intermittent, resulting in barren channels and isolated pools. There are sections of Chalone Creek that maintain a perennial flow (Bogan and Carlson 2018) and during the wet season, December through March, the groundwater supplemented by rainfall allows the intermittent streams to flow and reconnect the isolated pools. These pools are known to be diverse in nutrients and are an essential part of freshwater ecosystems (Blaustein and Schwartz 2001). Isolated pools are often overlooked but are essential transitional habitats, providing multiple uses by species: water/food source, shelter, or corridors and dispersal passages (Bonada et al. 2020).

Sampling methods

The Ruhi Lab deployed camera traps along documented perennial and intermittent streams within the study reach during the peak of the wet season, then lasted the duration of the summer and fall months until once observed to have fully lost the surface water. The sampling period is from February 28th, 2022 to November 13th, 2022. There are six different reaches which capture the sample pool (deepest pool), streambed, streambank, and immediate vegetation (Table 1, Figure 1). The reaches observed are part of an isolation control and reestablishment of community structure experiment conducted by the UC Berkeley Ruhi Lab. We chose these sites due to the knowledge of intermittency and the ability to dry and reconnect once the wet season begins. This provides the opportunity to observe wildlife behavior and dispersal along the watershed.

Table 1. Site names and locations for all six study sites in the streams of Pinnacles National Park. Site type refers to the type of flow at each site.

Stream	Site Name	Site Type	Latitude	Longitude
Bear Gulch	Green Gully	Intermittent	36.482766	-121.16837
Chalone Creek	Past Fence	Intermittent	36.444038	-121.14892
Chalone Creek	Above Highway Bridge	Intermittent	36.487606	-121.16991
Sandy Creek	Below Campground	Intermittent	36.489823	-121.14849
Sandy Creek	Above Campground	Intermittent	36.486886	-121.15289
Bear Gulch	Fern Gully	Intermittent	36.482957	-121.17146

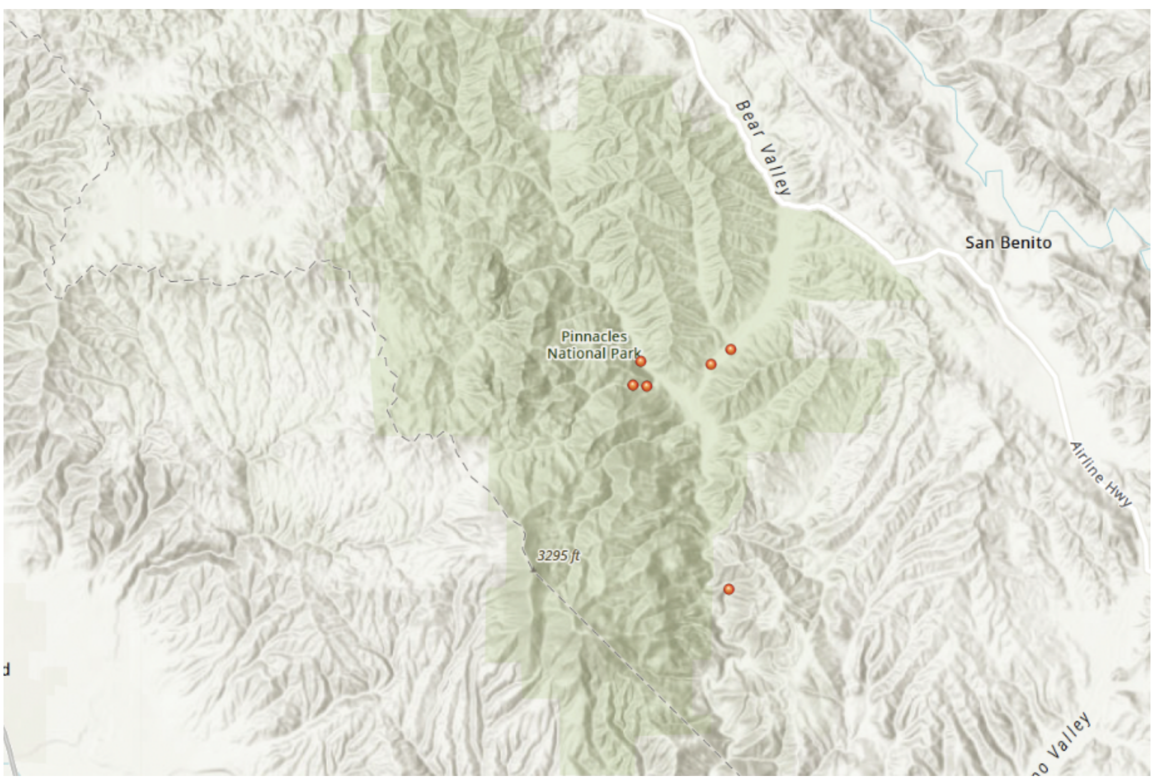

Figure 1. Study sites. Pinnacles National Park geographical location along with the six sites (Table 1).

Cameras collect video footage when triggered by “heat-in-motion” via a passive infrared sensor. Once triggered the video recorded a 20-second block with a 3-second gap in between subsequent videos. The video formats are chosen to understand the complete interaction of with streambed. 20-seconds was chosen as a sufficient video length for behavioral classification based on a published experiment where 15-seconds was the standard (Wingenroth 2019). A small percentage of animals had a visible reaction to the camera but deemed insignificant due to there being <2% of total interactions.

The cameras were propped up on nearby branches and secured down in preventions of vandalism and tampering by Pinnacles National Park visitors. The cameras were distanced 5-10 meters from the study pool in order to identify species and their behaviors. The camera provided a wide view of the study pool which showed the study pool, streambed, streambank and the vegetation up to 20 meters away. The sites are visited every 1-3 months in order to maintain proper camera angle, battery health, and memory storage. A number of camera footage through the months of August, September, and October were corrupted and the data was not able to be included in this analysis.

Data processing

We collected 5124 videos (28.47 hrs), 1455 videos (8.1 hrs) of which contained vertebrate interactions. Videos that were left out were either triggered by park visitors, moving branches, or glares off of the flowing stream. Habitat, behavioral and taxonomic classifications were conducted for all animals observed. The species were identified to the best possible manner using guides such as iNaturalist and the Cornell Lab of Ornithology.

We created categories based on a published animal behavior analysis (Wingenroth 2019). The habitats are organized into “air,” “vegetation,” “streambed,” “stream bank," "study pool,” “pool margin,” to classify the location of where the animal in the video is seen. If an animal were to move between habitats they were marked as being in all the habitats in which it came in contact with. Air defines if they were flying without touching anything else, vegetation is all branches and stems of upright plants around streams, stream bank is when an animal would be the area adjacent to the streambed. Streambed is if the animals are fully in the stream and study pool is if the animals are in the pool in which the isolation experiment was being conducted.

We classified behaviors into either stationary, exploring, traversing, flying, diving, fleeing, expelling waste, wading, or corridor usage. Animals that were stationary did not move in the frame or exhibited any type of movement. Exploring animals were searching through the stream or vegetation but did not have a clear direction of travel. Traversing is applied when an animal moves through the frame in a clear direction. Under the traversing category, the movement direction (laterally or longitudinally) itself was noted. An extension of traversing is corridor usage. If the species moved through the streambed and did not change direction, it would be considered a facilitated connectivity corridor. Animals that are flying were fully mid air for the duration of the video. Diving is defined for species that were fully submerged in the streambed and wading is assigned for species which were fully in the streambed while the water was present. Expelling waste was also noted if occurred.

Data analysis

Taxonomic identification

To identify the species that were captured by the camera traps I referenced iNaturalist and the Cornell Lab of Ornithology to get accurate taxonomic information. All vertebrates were identified to Class. Due to the quality of the cameras, not all species were able to be identified to species.

Behavioral interpretation

To classify the behaviors observed, I coded the camera data into habitat and behavior categories. The categories encompassed discrete behavior profiles that allowed vertebrates to get categorized in more than one way if it occurs. Along with the taxonomic information, I mapped out all behaviors along with a timeline which showed how behaviors changed through the span of hydrological phases as well as with temperature flux.

Frequency of visitation

In order to calculate the frequency of visitation, I summed all visits to the given stream throughout the day. To avoid overestimating individuals or inflate the frequency of visitation, the camera data were discretized into hour blocks (i.e., if two deer are entered and left the camera frame multiple times in a given hour, the count would only be two individuals for the entirety of that hour block). During a hour block, the video which contains the maximum number of individuals of a species would count towards the total count of individuals. To observe the difference between sites, I plotted each site with the number of visits. To compare the Class visitation rates, I plotted the visitations of a Class at the different sites. I also compiled the total number of visitors throughout the experiment dates to observe changes in visitation.

RESULTS

Terrestrial vertebrate diversity

In order to calculate the diversity of the vertebrates, I classified thirty-two different species to have interacted with all habitat types and saw 1878 vertebrate visits at the six different sites (Appendix A). The species with the highest number of total visits of the streams were Black-Tailed deer (*Odocoileus hemionus;* n = 471) and the Common Raccoon (*Procyon lotor*; n = 222). The least frequently seen species are the Spotted Towhee (*Pipilo maculatus*; n = 1) and the Pileated Woodpecker (*Dryocopus pileatus*; n = 1). We removed fish, amphibians, and reptiles from the study due to lack of data and interactions with the water. *Mammalia* (n = 1202) as a class interacted with the streams more than *Aves* (n = 676). I was able to identify 17 different species of birds but were only classified into Class as *Aves* and keeped as "bird," due the lack of details which the camera traps provided in order to classify with accuracy. I identified 15 mammals to species. I identified all bat species to Clade, leaving them as "bats" (n = 264) due to the lack of details that the camera data provided. For any small rodent that appeared near the stream was classified as Rodent (n = 31).

Behavior analysis

I put habitat classification into six different categories: air, margin pool, streambank, streambed, study pool, and vegetation (Figure 2). If a species interacted with more than one habitat then I considered it to have visited all that it did. There are 537 instances where vertebrates are found interacting inside of the streambed/margin pool; including discharge and a dry streambed. I found 528 observations of species interacting with the stream bank. This can be hypothesized due to the riparian zone's high productivity (Davis et al. 2011). The least common habitat observed was vegetation, which classification is all branches and stems of upright plants around streams.

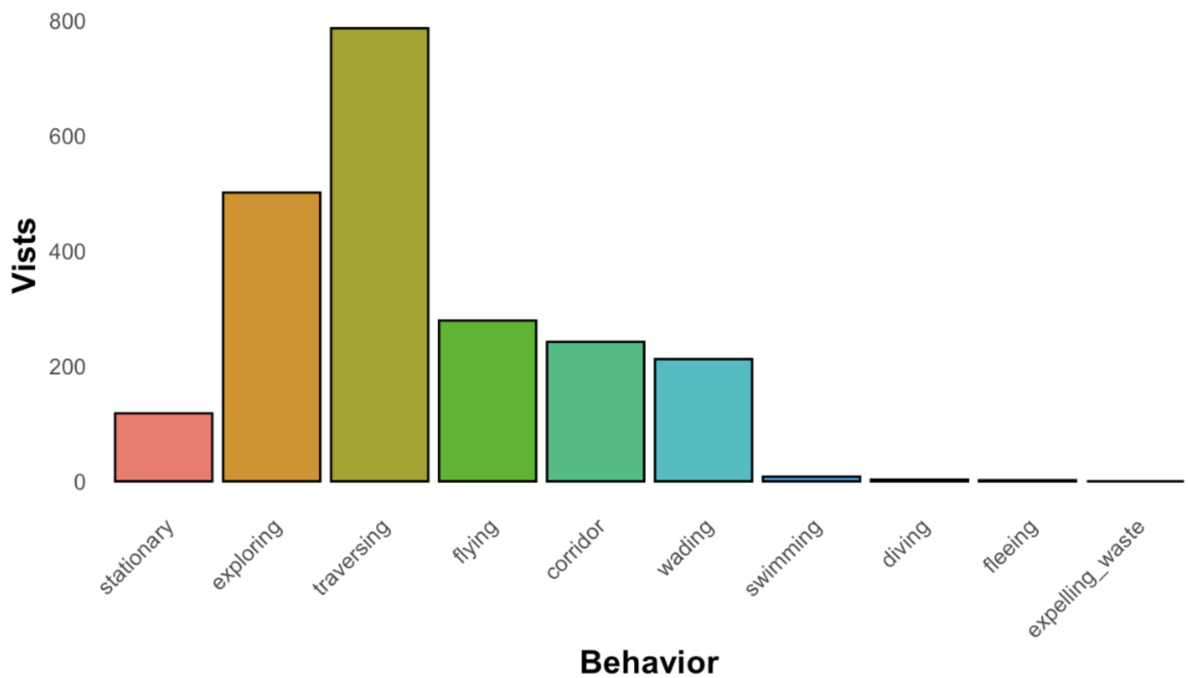

Figure 2. Summary of behavior visits. Swimming, fleeing and expelling waste is included but did not receive significant data.

We broke behavioral classification into eight categories: stationary, exploring, fleeing, flying, swimming, wading, traversing, diving, corridor. Within the traversing classification, two more behavioral actions were adapted for this study, if the species was either eating or drinking and if the species appeared to be using the streambed as a corridor passage for facilitated passage. 786 vertebrate visits resulted as traversing of which 31 percent (n = 242) showed corridor usage by the vertebrates (Figure 3). I bats flying (n = 210) for most of their interactions with the watershed. Many instances of swooping into the stream to eat and drink were observed. The behaviors that appeared the least are fleeing (n = 2) and diving (n = 3).

species	stationary	exploring	traversing	flying	swimming	diving	fleeing	expelling_waste	wading	corridor
<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
American_crow	0	4	6	2	0	0	0	0	0	0
Barn_Owl	2	0	0	0	0	0	0	0	1	0
Bat	0	17	45	210	0	0	0	0	0	6
Bird	35	83	65	46	0	0	0	0	0	10
Black_Phoebe	0	0	2	0	0	0	0	0	0	0
Blackheaded_Grosbeak	1	4	0	0	0	0	0	0	0	0
Blacktailed_deer	20	51	299	0	0	0	1	0	41	68
Bluegray_Gnatcatcher	2	4	5	2	0	0	0	0	1	1
Boar	0	4	3	0	0	0	0	0	2	3
Bobcat	2	4	12	0	0	0	0	0	0	4
California_Ground_Squirrel	0	2	2	0	0	0	0	0	0	0
Common_raccoon	2	80	108	1	0	0	0	0	122	94
Coyote	0	7	14	0	0	0	0	0	1	9
Desert_Cottontail	0	43	12	1	0	0	0	0	0	11
Duck	1	13	4	1	8	3	0	0	2	2
Fox_Squirrel	1	16	6	0	0	0	0	0	0	1
Gray_Fox	0	5	3	0	0	0	0	0	0	2
Great_Horned_Owl	2	1	3	0	0	0	0	0	3	0
Humming_Bird	0	0	0	6	0	0	0	0	0	0
Merriams_Chipmunk	0	1	2	0	0	0	0	0	0	0
Mountain_Lion	0	0	2	0	0	0	0	0	0	0
Mourning_Dove	2	3	83	3	0	0	0	0	0	0
Northern_Flicker	5	6	2	0	0	0	0	0	0	0
Pigeon	1	8	2	0	0	0	0	0	0	0
Pileated_Woodpecker	0	1	0	1	0	0	0	0	0	0
Quail	1	14	11	0	0	0	0	0	1	0
Rat	1	16	10	1	0	0	1	0	0	0
Sharpshinned_Hawk	0	1	2	2	0	0	0	0	0	0
Spotted_Towhee	0	1	0	0	0	0	0	0	0	0
Stellers_Jay	16	11	6	0	0	0	0	0	7	0
Striped_Skunk	0	0	3	0	0	0	0	0	0	0
Turkey	0	11	0	0	0	0	0	0	0	0
Western_Scrubjay	19	61	20	2	0	0	0	0	23	0
Willow_Flycatcher	5	18	3	1	0	0	0	0	0	2
cow	0	11	51	0	0	0	0	0	8	29

Figure 3. Behavior by species.

Visitation frequency

I plotted the total number of visits on a scale that represented a time series to show the distribution of how each individual species interacted with the watershed through the time the cameras were deployed (Figure 4). Mammalia (0.64 per trap-day) was observed to interact more frequently with streams than Aves (0.36 per trap-day). Throughout the experiment sites, Fern Gully was recorded to have the most Mammalia visits. Green Gully, downstream from Fern Gully, has more visits from Aves (Figure 5). Site Sandy Creek 4 did not receive many visits, being the lowest visited site of the study. Overall Mammalia interacted more with the streams. The frequency of visits showed that they are higher during the months of May to June (weeks 21-23) and the highest temperature recorded was 53 °C and the lowest was -3 °C(Figure 6).

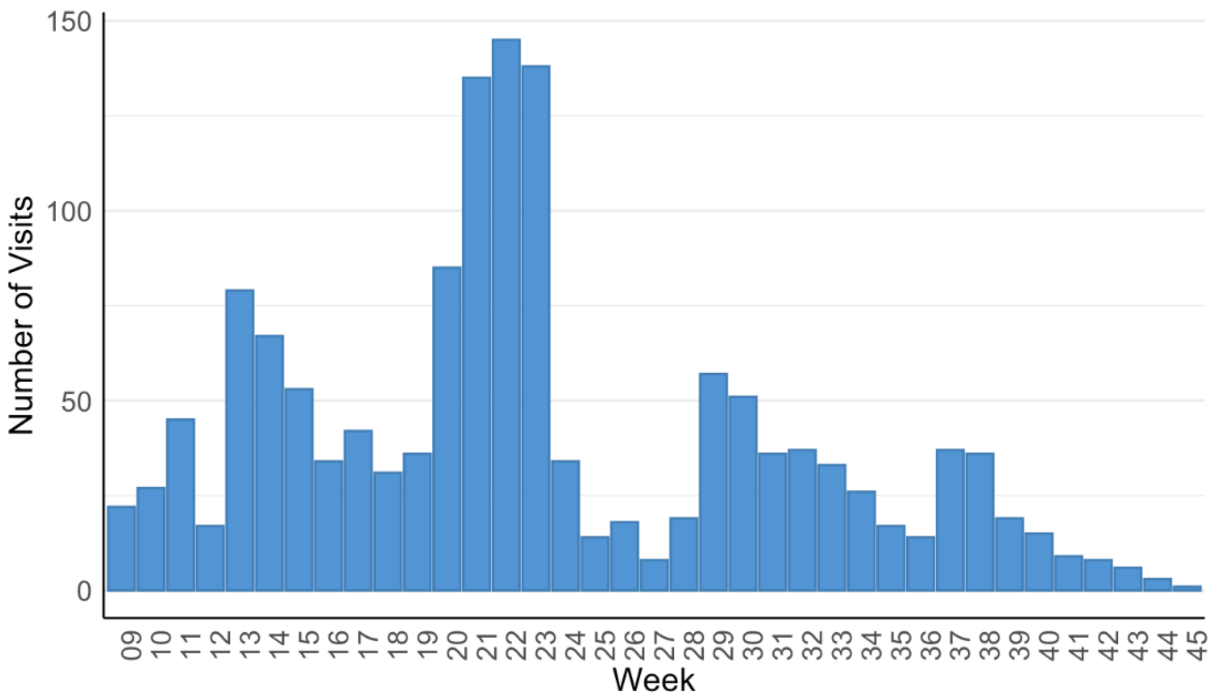

Figure 4. Distributions of observations per week the span of 36 weeks. Peak at week 22 was mainly composed of bird interactions with watersheds.

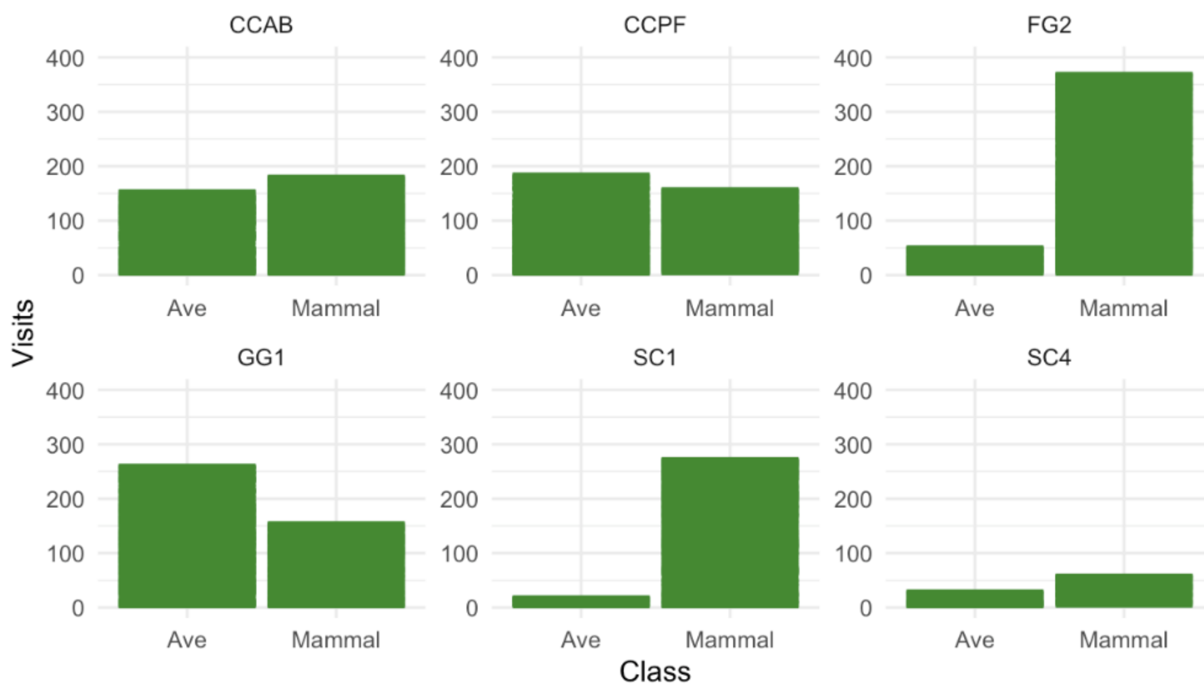

Figure 5. Visits of class at six study sites. The six sites were independent from each other. SC4 saw little movement overall.

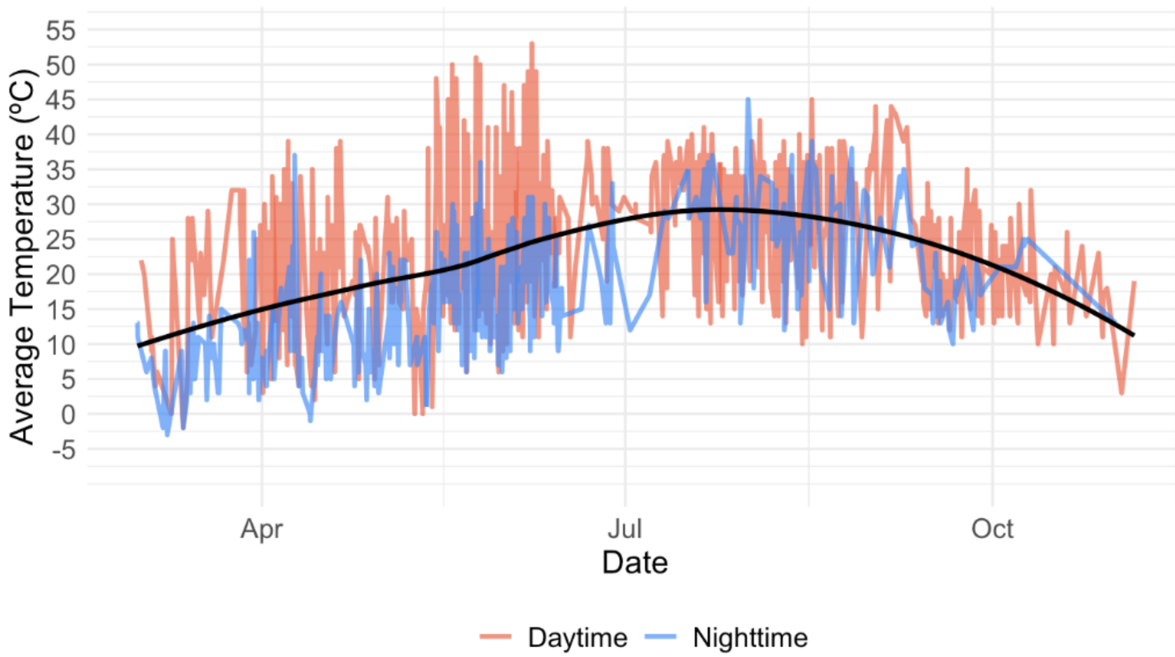

Figure 6. Daily average temperatures. Temperature observed through study. The gap between June and July shows a lack of visits during those weeks. The peak temperature recorded was in May and the coldest was -3 °C in March.

DISCUSSION

Mammalia interacted with the intermittent streams with a higher frequency than Aves. During the hotter weeks of the year, there were higher interactions overall with the watershed. Native species that interact with such non-perennial watersheds have adapted to the changes in flow, including channel drying (Valente-Neto et al. 2020). The receding of surface water changes how species interact with the ecosystems (Pernecker et al. 2020). Species prioritize their survival and this can be seen with movement between ecosystems (Morton et al. 2018). By looking at the behaviors that terrestrial vertebrates portray during different seasons, we are able to determine different consistency patterns of different species. Observing the visitations of streams allowed me to understand how different streams at Pinnacles National Park had different levels of interactions from various species. I found that Green Gully had a higher visitation rate (0.17 per trap-day) than the other sites and was balanced between Mammalia and Aves (Figure 4). The stream geomorphology of Green Gully (GG1) is a depression from the nearby hiking trail and is mainly bedrock. Aves visited this site the most. Chalone Creek Past Fence (CCPF) also had a higher visitation rate of Aves compared to the other sites. Chalone Creek Above Highway Bridge (CCAB) showed to be preferred by Mammalia but the difference between Aves was under 50 visits. Sandy Creek (SC1) Below and Above Campground (SC4) has an overall low Aves count and this could be due to the proximity to the campgrounds. Fern Gully (FG1) with a visitation rate of 0.39 per trap-day tended to cater to Mammals than birds.

Biodiversity

I identified thirty-two species, which interacted with the stream in a variety of ways. Raccoons are seen constantly foraging and wading in the streambeds and while deer are seen drinking from the streambank. Blacktailed Deer had the highest count of interactions with the streams. Desert Cottontails were often observed as well as bats. Bats were not identified past Clade. Sites CCPF and GG1 had the highest diversity between sites. I hypothesize that these sites have higher levels of water during the year compared to the other sites. The conditions of the stream and the proximity to an active trail of road will skew the visitation rates. The unidentified birds with over 200 interactions would increase the biodiversity number. I was not able to identify the bat species but it is estimated that 3 back species are active at the location of the sites.

Wildlife behaviors

Ethological data is a key component to understanding how food web systems function and ways in which ecosystems stay alive. Understanding what certain species do when approaching a stream channel can help see the vitality of water flow during certain times of the year (Mesa-Zavala et al. 2012). Birds come to the stream to feed on macroinvertebrates and other critters while raccoons are most likely fishing (Downie et al. 1998, Hodges et al. 2000). Larger animals like deers and bobcats are drinking water. During the hotter season, Blacktailed deer used the stream channels as corridors. The most frequent behavior by Class allows for a view into how certain Classes interact with the watershed. Interactions between different species were hardly captured which could add to the competition of resources in the IRES ecosystem (Piano et al. 2019).

Species visit frequency

The 258 days between February 28th, 2022 to November 13th, 2022 resulted in an average 7.28 visits per day of terrestrial vertebrates at Pinnacles National Park. This average is for the entirety of the six sites which by site, 1.21 visits per day is the average. Summing the total number of visits at each site and comparing them across sites shows that there is a higher frequency of visitation during the dry season (n = 1257) in comparison to the wet hydrological phase (n = 621) of the watershed. I identified the cut off of the dry seasons May 9th - October 5th as found by NOAA. Comparing the amount of times that each site experienced a visit from a vertebrate allowed for a holistic understanding of how often a species interacts with the watershed but also what the species prefers to do while around it. I took a daily frequency for each site and then the sites were also compared to see the total frequency of the wet and dry season. It was found that species preferred to interact with the stream channel when the temperatures were peaking.

By using the camera traps I was able to assess the behavior and frequency patterns of mammals and birds at Pinnacles National Park. I found that the number of visits were higher during the dry season rather than the wet season. This observation can be seen by Figure 4 and Figure 5 shows how the temperatures were the highest during those weeks as well. The frequency between sites was noticed the most when comparing Mammalia and Aves but some sites did not show much difference or preference between the two. For species to interact with the watershed more during the dry season can be seen as how the intermittent streams provide species with the needed water during times when there is an abundance of water. Ethological data allows us to see how species would interact with the streams and it is beneficial to have a holistic view of the ecosystem. The more data that can be collected and interpreted surrounding wildlife interactions with intermittent streams, the better conversationalists and researchers can target climate change impacts that can be detrimental to the native species of Pinnacles National Park.

Limitations and future directions

While a lot of data was collected, several groups of camera data were lost to human error and card failure. The standardization of camera location and set up coordinates needs to be done. The dataset that is derived from the camera data that I processed is very usable for qualitative analysis which adds to the knowledge of wildlife at Pinnacles National Park. I believe that by recording data from an entire seasonal year, from the beginning of a wet season to the beginning of the next wet season would create a better timeline and be able to compare more sites. Also having more site points throughout the park would serve to conduct more thorough statistical analysis for comparing site features and possibly understand preference of different species. Pinnacles National Park was established in 2013 and numerous researchers are collaborating to have a full inventory of species abundance, richness, and assemblage compositions. I believe that by conducting baseline inventories of the species that exist and understanding the flow requirements of the species present will serve to protect the species from the effects of climate change. Assessing existing populations help with continuing wildlife and freshwater ecology research and by having more data and research, better conservation decisions can be made.

Broader implications

Climate change is affecting hydrology patterns and since streams are a huge source of water to animals that live in Mediterranean climates, improper water and land management can cause ecological devastations (Fierro et al. 2019). By understanding the behavior that species in this ecosystem show, we are able to predict future changes to facilitate ecological protection efforts in Pinnacles National Park as well as other ecosystems that have similar characteristics as it (Albright et al. 2010). Species that rely on cross ecosystem subsidies also contribute towards the health of an ecosystem. Research that assesses baseline inventories of populations will help conservational researchers and lawmakers make better and more informed decisions for biodiversity protection.

ACKNOWLEDGEMENTS

I'd like to thank Patina Mendez and Melissa von Mayrhauser for their incredible patience and support throughout the creation of my senior thesis. Albert Ruhi was an integral part of keeping me excited throughout the writing and analysis process as well as other members of the Ruhi Lab. Thank you Travis Apgar and Kyle Leathers for bringing out the scientist in me. I could barely accept the fact that I attended UC Berkeley and now I have completed my senior thesis. Thank you friends for constantly hearing me speak about my thesis and the hours I've put into it.

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APPENDIX A:

Table A1.

Common Name	Proper Name	Count
Northern Flicker	Colaptes auratus	13
Desert Cottontail	Sylvilagus audubonii	56
Western Scrubjay	Aphelocoma californica	110
Common raccoon	Procyon lotor	222
Blacktailed deer	Odocoileus hemionus	471
Boar	Sus scrofa	7
Quail	Callipepla californica	70
Bobcat	Lynx rufus	17
Turkey	Meleagris gallopavo	23
Bluegray Gnatcatcher	Polioptila caerulea	8
Stellers jay	Cyanocitta stelleri	31
Sharpshinned_Hawk	Accipiter striatus	3
Fox Squirrel	Sciurus niger	26
Coyote	Canis latrans	21
Gray Fox	Urocyon cinereoargenteus	8
Spotted Towhee	Pipilo maculatus	1
Mountain Lion	Puma concolor	2
Great Horned Owl	Bubo virginianus	5
Willow Flycatcher	Empidonax traillii	28
Blackheaded Grosbeak	Pheucticus melanocephalus	5
Bat	unidentified	264
Rodent	unidentified	31
Black Phoebe	Sayornis nigricans	2
Mourning Dove	Zenaida macroura	153
Striped Skunk	Mephitis mephitis	3
Bird	unidentified	210

American crow	orvus brachyrhynchos	12
California Ground Squirrel	Otospermophilus beecheyi	5
Merriams Chipmunk	Neotamias merriami	3
Pileated_Woodpecker	Dryocopus pileatus	1