



# City of New Albany, Indiana

Jeff M. Gahan

Mayor

## 11.17.2022 - Information Regarding Ongoing Efforts at Historic Glenmill Dam

**Dear New Albany City Councilors,**

For good reasons, New Albany residents have expressed concerns about the sudden effort to destroy our Historic Glenwood Park Dam. River Heritage Conservancy from Clark County has paid an upstate contractor to do just that without regard to the possible damages to the City of New Albany, Silver Creek, and the surrounding neighborhoods and wildlife.

The City of New Albany has been fending off this aggression by trying to open a dialog with all parties to explore possible alternatives, and the need for additional review, before the \$1.5 million historical asset is gone forever.

I was pleased to see others, like yourselves, that have stepped up to express their concern as well.

The state-appointed Floyd County Historian, as well as the state's Indiana Landmarks historic preservation organization have both stated that the dam should be preserved, not destroyed.

The New Albany City Council, composed of Democrats, Republicans, an Independent, and a Libertarian all united and voted unanimously for a resolution that stated all options should be explored and mediation should occur before the historic dam is permanently removed.

And yet, before I even had a chance to sign the resolution, River Heritage Conservancy and Origin Park officials Vern Eswine, Kent Lanum, and Susan Rademacher issued a press release stating that "River Heritage Conservancy declines" to meet and discuss any alternatives. A copy of that press release is attached to this letter. Even though those three non-elected officials have refused to meet with us, we will continue reaching out to all parties involved to best represent the people of New Albany.

Below are some reasons why everyone should be concerned, and why we should take a brief pause, before an outside agency moves forward with the destruction of one of our city's historic assets that has served us well during flooding season and summer drought for more than 100 years.



# City of New Albany, Indiana

Jeff M. Gahan

Mayor

1. The ownership of the historic Glenwood Park Dam is still under question. (fig. 1)
2. The dam has historical significance, as noted by comments from the state-appointed Floyd County Historian as well as the State of Indiana's "Indiana Landmarks" historic preservation organization. (fig. 2)
3. There may be potential contaminants that could be released and pollute the local waterways if the dam is destroyed. (fig. 3)
4. The City of New Albany has invested both time and resources into the development of the area for nearly a decade, including the nearly-finished Silver Creek Landing and Providence Way improvements, of which removal of the dam could compromise. (see attached timeline)
5. While the City of New Albany recognizes and agrees that some low-head dams can be dangerous, the historic Glenwood Park Dam is not listed on the Indiana Department of Natural Resource's inventory of dangerous low-head dams. In addition, the City of New Albany has proposed safe alternatives to the removal of the dam, including a conversion to a "rock-arch rapids" which scientists and engineers agree improve safety near dams. (fig. 4)
6. The removal of the dam could reduce water levels and result in fewer days to paddle, kayak, canoe, or conduct other forms of water recreation along Silver Creek. (fig. 5)
7. Origin Park has now received over \$8 million in public funding through the State of Indiana's READI grant. By accepting \$8 million in residents tax dollars, Origin Park officials should conduct some form of public-input sessions before tax dollars are spent on a project with no elected oversight. (fig 6)
8. The Indiana Environmental Resiliency Council warns of climate change impacts and environmental risks related to water supply, and removal of the dam could potentially cause the City to lose the water supply that is currently in place along Silver Creek. (fig 7)

These issues can all be resolved, but Origin Park officials continue to refuse to meet and discuss alternatives to removing the historic Glenwood Park Dam. To remove the dam costs about \$75,000. To install a new dam would cost nearly \$2 million. Before an out-of-town entity removes historic pieces of New Albany infrastructure, let us ensure that we are considering all options before it is too late.

A handwritten signature in black ink, appearing to read "Jeff Gahan".

Mayor Jeff Gahan

# RIVER HERITAGE CONSERVANCY

## NEWS RELEASE

November 16<sup>th</sup>, 2022

### IN RESPONSE TO CITY COUNCIL RESOLUTION

In response to the New Albany City Council's recent resolution seeking to enter mediation with Ecosystems Connections and River Heritage Conservancy, regarding the removal of a low head dam on Silver Creek, referred to as Providence Dam, River Heritage Conservancy declines.

River Heritage Conservancy has always welcomed and provided many opportunities for the City of New Albany to engage on this project despite what is implied within this resolution. In fact, discussions of the expansion of the Greenway, including issues with Silver Creek can be traced back to the Southern Indiana Regional initiatives report dated December 2014.

In regard to the legal action referenced in the resolution that Mayor Gahan and the City of New Albany have proposed, including their legal filings against Indiana's Department of Natural Resources and their contractor, Ecosystems Connections Institute, on the dam removal permit, River Heritage Conservancy is simply not a party to this pending legal challenge and therefore does not see a need nor a benefit from entering into mediation between the two opposing parties. We look forward to the upcoming determination of this appeal and its final resolution of the matter at hand, however it is decided.

As a non-profit Conservancy, we do believe that removing such dams has been proven beneficial to both the safety of those using the creek to fish, canoe and kayak, as well as scientifically improving the quality of the water and aquatic life, both above and below the dam long-term.

Going forward we hope that this matter can be resolved quickly and that in the days and years to come, we can all work together, in cooperation, to build a park that celebrates all aspects that Jeffersonville, Clarksville, and New Albany enjoy as part of Ohio River history.

### About the Park

Origin Park is a 430-acre park build located in Clarksville, Indiana. With over 70% of the needed land already purchased or under MOUs through private funding, the park, when completed, will be the only urban park in the United States that embraces flooding and reclaims property that is currently home to landfills and junk yards, repurposing them for public use. Origin Park is a project of River Heritage Conservancy. For more information go to [www.riverheritageconservancy.org](http://www.riverheritageconservancy.org) or [www.originpark.com](http://www.originpark.com).

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### TIMELINE OF SILVER CREEK LANDING AND DAM PROJECTS

#### Dates of Relevance Regarding Silver Creek Landing, River Heritage (Origin Park) and City Officials

2014/2015

- Silver Creek Landing Phase I - Planning Begins at base of Glenwood Park Dam.

2015

- City Master Park Plan begins with Silver Creek Landing as component

4/4/2016

- City purchased Loop Islands

10/26/2016

- Silver Creek Access Phase I - Presented to Board of Works
- Tribune Reports on Project - [https://www.newsandtribune.com/news/improvements-planned-for-providence-way-underpass-in-new-albany/article\\_ddf78876-9ad5-11e6-8bb2-530979eaf940.html](https://www.newsandtribune.com/news/improvements-planned-for-providence-way-underpass-in-new-albany/article_ddf78876-9ad5-11e6-8bb2-530979eaf940.html)

11/22/2016

- River Heritage Conservancy Created via Indiana Secretary of State filings

12/13/2016

- Tribune Reports on Bids for Phase I of Silver Creek Access - [https://www.newsandtribune.com/news/bids-taken-for-providence-way-improvements-in-new-albany/article\\_93c0f7c0-c162-11e6-ad2c-1bda1b321db3.html](https://www.newsandtribune.com/news/bids-taken-for-providence-way-improvements-in-new-albany/article_93c0f7c0-c162-11e6-ad2c-1bda1b321db3.html)

7/2017

- Scott Martin hired by River Heritage

2017 (End of Year)/Early 2018

- City finishes Phase I of Silver Creek Access at Glenwood Park Dam.

11/8/2018

- Mayor and Martin meet regarding Origin and City Parks, including discussion about Silver Creek access, canoeing, kayaking and the Silver Creek "Blueway."

2018/2019

- Greenway Bridge across Silver Creek at Loop Island construction nears completion which opened the entire route of Ohio River Greenway between Jeffersonville, Clarksville, and New Albany.

1/17/2019

- Mayor and Scott Martin meet.

2020

- Silver Creek Landing Phase II design at Glenwood Park Dam.

3/18/2020

- Mayor and Scott Martin meeting, cancelled by Martin, prior to reveal of Origin Park initial master plan.

4/27/2020

- Origin Master Plan revealed - [https://www.wdrb.com/in-depth/master-plan-name-unveiled-for-ohio-river-park-in-southern-indiana/article\\_ae4eff82-e8ab-11ea-beaa-0752fcea1864.html](https://www.wdrb.com/in-depth/master-plan-name-unveiled-for-ohio-river-park-in-southern-indiana/article_ae4eff82-e8ab-11ea-beaa-0752fcea1864.html)
- Origin Master Plan – highlights areas outside their control and ownership such as Loop Island, the Greenway Extension to Silver Creek Landing, and western portions of the Greenway (all which are owned by citizens of New Albany).

5/27/2020

- Mayor and Scott Martin meeting regarding Origin Master Plan – after it is revealed.

8/5/2020

- WFPL reports on Trail Amenities project with Silver Creek access at Glenwood Park Dam - <https://wfpl.org/new-albany-officials-look-to-amplify-natural-amenities-with-trail-projects/>

9/2020

- River Heritage AND Ecosystems (out of Denver, IN) awarded \$75,000 grant to remove dam well after being advised of City's plans for Silver Creek Phase II.

1/21/2021

- Presentation to City Council of Shoreline Plans and Projects
  - Included Silver Creek Landing Phase II and access

1/22/2021

- Tribune Article on New Albany Shoreline with detailed projects – including the Silver Creek access and kayak amenities for the Silver Creek "Blueway" - [https://www.newsandtribune.com/news/new-albany-shoreline-plan-detailed-during-council-meeting/article\\_9542a5ee-5cbd-11eb-a63e-2b6fee4d15d1.html](https://www.newsandtribune.com/news/new-albany-shoreline-plan-detailed-during-council-meeting/article_9542a5ee-5cbd-11eb-a63e-2b6fee4d15d1.html)

1/27/2021

- Ecosystems and River Heritage file for permit to remove Glenwood Park Dam at Silver Creek Landing.
  - Glenwood Park Dam is NOT on the DNR registry of dangerous low head dams.

3/25/2021

- WFPL reports on Origin Park (River Heritage) Silver Creek Blueway project which includes kayak area just south of City's location - <https://wfpl.org/origin-park-officials-announce-silver-creek-blueway-project/>

5/25/2021

- First project of Origin Park – remove Providence Mill Dam at location of City's Silver Creek Landing despite being aware of the City's intentions and project.
- [https://www.newsandtribune.com/news/origin-park-s-first-project-public-access-to-silver-creek/article\\_7ce7e560-8d80-11eb-a85f-1bd09f0642a4.html](https://www.newsandtribune.com/news/origin-park-s-first-project-public-access-to-silver-creek/article_7ce7e560-8d80-11eb-a85f-1bd09f0642a4.html)

6/9/2021

- Permit to remove dam issued by DNR to Ecosystems. River Heritage despite being awarded grant money does not sign and/or file the permit to remove Glenwood Park Dam.

6/25/2021

- City seeks administrative review of permit issuance

8/10/2021

- Meeting Shane Gibson, Josh Staten, and Scott Martin: discussed the removal and impact on City's project and the use of Loop Island and other amenities of New Albany without proper recognition or designation.

12/17/2021

- Scott Martin resigns from River Heritage.

1/5/2022

- Susan Rademacher hired as River Heritage Director.

4/6/2022

- Susan Rademacher (River Heritage Director), Doug Scott (River Heritage Director of Development), David Wicks (Ohio River Way), and Mayor meet. Silver Creek and projects were discussed.

5/16/2022

- City breaks ground on Phase II of Silver Creek Access
- City also breaks ground on Greenway Extension to Silver Creek Landing
- <https://newalbanycityhall.com/home/2022/5/16/new-access-to-silver-creek>

8/17/2022

- Ms. Rademacher and Mayor meet.

8/23/2022

- Mayor and Susan Rademacher, River Heritage Director, have schedule phone call.

8/26/22

- Requested meeting/call with River Heritage to discuss dam removal.
  - Ms. Rademacher declined, stated "only appropriate path of communication at this time is through attorneys...." River Heritage is not part of the legal appeal.

9/20/22

- Fire and Police Chiefs meet with River Heritage Director and Director of Operations to discuss city's ability to assist in policing and water rescue along Silver Creek and Origin Park's kayak/canoe access points.

10/21/2022

- Requested meeting/call to discuss removal with River Heritage.
  - Ms. Rademacher declined to meet and discuss dam.

11/1/2022

- Ecosystems and River Heritage indicate they are not agreeable to mediate.
- River Heritage indicates that they are not agreeable to participating in a mediation regarding the dam removal and the permit to do so by Ecosystems.

11/4/2022

- Indiana Landmarks Letter in support of preserving Glenwood Park Dam on Silver Creek.



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 Board of Health  
 Recorder, Kings County

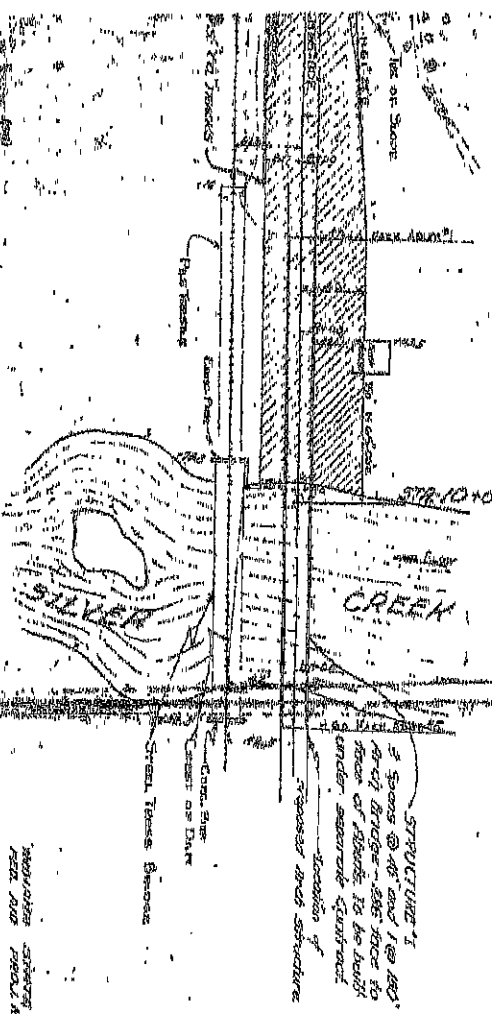
Reviewed  
 The Board of Health  
 of Kings County  
 Kings County  
 Recorder, Kings County

Filed and recorded  
 in Book No. 536  
 of the  
 Recorder, Kings County



Approved by  
 The Board of Health  
 of Kings County  
 Recorder, Kings County

Approved by  
 The Board of Health  
 of Kings County  
 Recorder, Kings County



1. The structure described herein is to be built on the right of the  
 Board of Health of Kings County and is to be built in accordance with the  
 provisions of the Health Law and the rules and regulations of the  
 Board of Health of Kings County.

**RIGHT OF WAY MAP**

Showing  
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 of Kings County  
 Recorder, Kings County

1-5-9

1-4

Figure 1

Figure 1

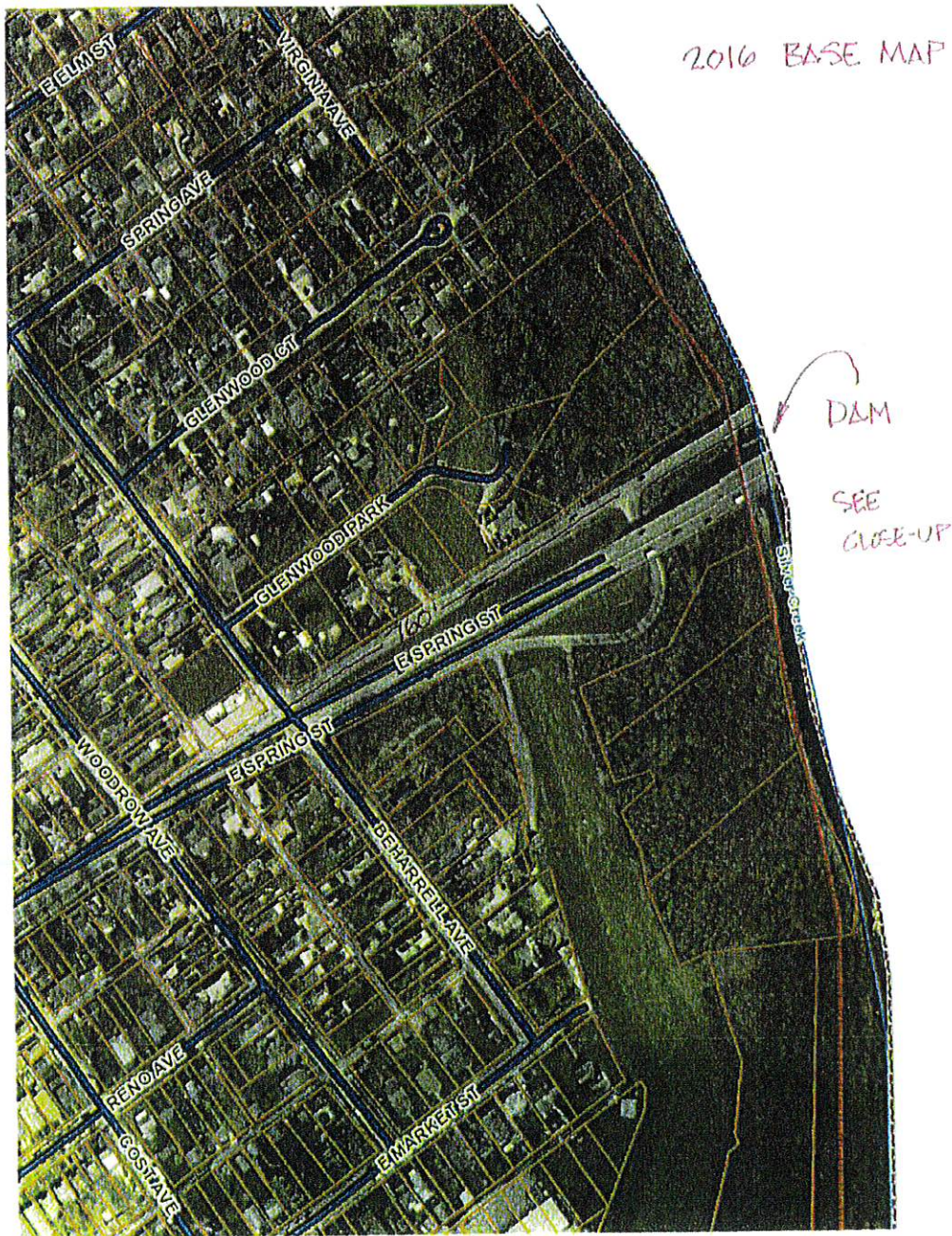


Figure 1



Figure 2



INDIANA LANDMARKS

Southern Regional Office  
911 State Street, New Albany, IN 47150  
618 284 4884 / 800 480 4884 / [www.inlandmarks.org](http://www.inlandmarks.org)

November 4, 2022

The Honorable Jeff Gahan  
Mayor  
City of New Albany  
142 S. Main Street  
New Albany, IN 47150

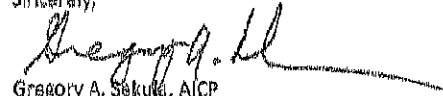
RE: Glenwood Park Dam on Silver Creek

Dear Mayor Gahan:

This letter is to acknowledge that Indiana Landmarks supports efforts to preserve the Glenwood Park dam on Silver Creek. The dam is a historic landscape feature that was created in 1905 by the Louisville and Southern Indiana Traction Company to create a creek pool for swimming, boating, and fishing activities connected with Glenwood Park, a private amusement park opened in 1904 that was originally located on the west side of Silver Creek. This area is now a residential neighborhood bearing the Glenwood Park name.

Indiana Landmarks encourages the Indiana Department of Natural Resources Division of Water to work with the City of New Albany, Origin Park representatives, and other parties involved to develop a mutually agreeable plan that preserves this last vestige of Glenwood Park and also allows for increased recreational opportunities along Silver Creek.

Sincerely,

  
Gregory A. Sekula, AICP  
Southern Regional director  
Indiana Landmarks

### **Literature Review of Dam Removal Studies Across the United States from 1973 to Present**

The effects of dam removal continue to be under-studied. Less than one percent of the dams removed in the United States since the 1970s have been accompanied by any ecological or geomorphic assessments. Such lack of scientific assessment is troubling given the increasing frequency of dam removal and its justification in terms of favorable ecological results. This is especially concerning as some aspects of less frequently assessed ecological responses have shown wide variation in magnitude and time span and may take years to detect (Mahan et al., 2021).

The attached report is a literature review of dam removal studies across the United States spanning from 1973 to present day. This report is compiled to provide considerations of potential risks and to provide recommendations for future assessments as they may apply to the proposed removal of the historic Glenmill Dam. The report is by no means an exhaustive list and instituting multivariate techniques in monitoring the impacts of dam removal are suggested.

The literature review offers five major areas of concerns: endangered species, polluted sediments, invasive species, climate change, and elevated turbidity.

Based on the findings of the review, five prescriptions for future assessments are recommended: status review of species, sediment quality assessment, assessment impacts from invasive species, climate change predictions, and a water quality standard review.

Attachments:

- (1) Dam Removal Impacts and Considerations
- (2) Species of Greatest Conservation Need

## Dam Removal Impacts and Considerations

### Introduction

The following report is an examination of research related to dam removal and to assess the potential impacts to existing ecosystems and infrastructure. The report provides summaries of four articles that present arguments for investigating concerns of endangered species, polluted sediments, invasive species, future climatic conditions, and elevated turbidity resulting from dam busting. The report concludes with five recommendations for assessing the positive and negative ecological and physical impacts to be included in the prioritization processes of dam removal.

### Literature Review

#### *Endangered Species and Polluted Sediments*

The Economist article discusses one of the largest breeding populations of an endangered bird, the western willow flycatcher. This habitat exists due to the Lake Isabella Dam, completed in 1953, which created floodplains that allowed the riparian habitat to flourish. The article notes that in some instances, removing a dam can do more harm than good, especially when endangered species are involved<sup>1</sup>.

The article notes that in California, more than 90 percent of the state's natural wetlands have been lost to development, thus displaced species have had to make do with whatever habitat they can find. Although the wetlands that are created by a dam may not be comparable to what was there before, an environmental scientist at the San Francisco Estuary Institute in Richmond, California notes that most biologists agree that while removing dams may help native species, returning waterways to their natural state is an ideal that realistically can never be met. Instead, it is recommended to leave an existing dam in place to preserve the species that remain.

Additionally, the article notes that the conservation group, American Rivers, finds that dam removal can prove detrimental when the dam is holding back polluted sediments. Several examples are provided, including the Fort Edwards Dam on the Hudson River in New York. In 1973, the removal of this dam released several tons of sediment containing polychlorinated biphenyls (PCBs). PCBs are extremely persistent organic pollutants that are toxic to fish and other aquatic and terrestrial species. Three years after the dam removal, fishing was banned and clean up began in 1976. As of September 2022, nearly 30 years after the removal of the dam, the Hudson River PCBs Superfund site continues to be investigated for next steps to address the contamination<sup>2</sup>.

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<sup>1</sup> The Economist, vol. 358, no. 8211, Mar. 2004, p. 76. EBSCOhost, <https://search-ebscobost-com.echo.louisville.edu/login.aspx?direct=true&db=a9h&AN=4150958&site=ehost-live>.

<sup>2</sup> Hudson River Cleanup. (2022, September 13). US EPA. <https://www.epa.gov/hudsonriverpcbs/hudson-river-cleanup>

Figure 3

### *Invasive Species*

The 2020 research article, *Response of Benthic Macroinvertebrates to Dam Removal in the Restoration of the Boardman River, Michigan, USA*, examined changes in stream macroinvertebrates communities from 2011 to 2016. Comparisons were focused above, below, and before and after the October 2012 removal of the Brown Bridge Dam on the Boardman River in Michigan. The study notes that the effects of dam removal continued to be understudied with less than one percent of the dams removed in the United States from the 1970s have been accompanied by any ecological or geomorphic assessments<sup>3</sup>. Such lack of scientific assessment is troubling given the increasing frequency of dam removal and its justification in terms of favorable ecological results, especially since some aspects of less frequently assessed ecological responses have shown wide variation in magnitude and time span and may take years to detect.

The researchers examine benthic macroinvertebrates, as they are foundationally important to the food chain in aquatic systems. Macroinvertebrates are sensitive to habitat quality, water pollution, sediment changes, and many are site specific in such sensitivity because of relatively low mobility in the stream. Therefore, changes in their abundance can serve as fine-scale indicators of stream quality, stream restoration, and recovery after disturbances. The Brown Bridge Dam removal was initiated in September 2012 and completed in January of 2013. Restoration efforts included removal of 198,784 cubic meters of sediment, alignment with the relic stream bed, placement of more than 1800 meters of woody debris for bank stabilization and in-stream habitat, downstream sediment traps, and riparian plantings. Recognizing that dam removal can have a wide range of longer-lasting impacts on aquatic communities, the researchers used the opportunity created by the Brown Bridge Dam to conduct a six-year study from 2011 to 2016, monitoring responses of benthic macroinvertebrates. Benthic macroinvertebrates were used as indicators of ecosystem quality to assess the river before and after the dam was removed in September 2012. The objective of the study was to monitor changes in benthic macroinvertebrate community composition in the Boardman River above and below the Brown Bridge Dam, before and after dam removal, and in newly created restored channel habitat following removal. Through their investigation, they determined how stream macroinvertebrate communities changed over time in response to the presence and removal of a dam.

The study recorded high densities of the New Zealand mud snail, which they first detected in 2013. Although it is unknown when they were introduced to the Boardman River, their initial detection in the Great Lakes system was found in 1991. The research team concluded that given the popularity of the Boardman for recreational fishing and canoeing, transmission of individuals on waders or boats from neighboring invaded watersheds seemed most likely. Whatever the movement vector leading to introduction, the researchers suspect that the arrival of the mud snail was inevitable, given its presence in neighboring watersheds, and not originally facilitated by the presence of dams on the Boardman River or by the dam

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<sup>3</sup> Mahan, David C., et al. "Response of Benthic Macroinvertebrates to Dam Removal in the Restoration of the Boardman River, Michigan, USA." PLOS ONE, vol. 16, no. 5, May 2021, pp. 1-19. EBSCOhost, <https://doi-org.echo.louisville.edu/10.1371/journal.pone.0245030>.

removal process. However, the mud snail's spread to downstream reaches of the Boardman River was almost certainly advanced by dam removal, especially because the New Zealand mud snail is known to be an effective passive disperser, one that could exploit the increased stream connectivity following dam removal or by rapid movement of a large volume of water associated with the sudden dewatering event. The study supports this explanation as the researchers observed increasing presence of mud snails at sites further downstream from 2013 to 2016. Mud snail populations also flourished in the restored channel in the former reservoir, consistent with the fact that mud snails have been observed to thrive in disturbed areas.

Studies of New Zealand mud snail invasions indicate that these snails could threaten many species in native macroinvertebrate communities. Increasing numbers of mud snails from 2013 to 2016 in the Boardman River may have interacted with changes in community composition associated with dam removal.

#### *Climate Change*

The research article, *Rethinking refuges: implications of climate change for dam busting*, notes that climate change is projected to alter river discharge in every populated basin in the world and that the potential influence of climate change on the impact of dam removals has received almost no consideration. The researchers argue that in regions where the major impact of climate change will be to reduce streamflow and aquatic refuge availability, a shifting balance between the negative and positive environmental impacts of dams requires climate change predications to be included in prioritization processes for dam removal<sup>4</sup>.

The article notes that ecological changes resulting from the removal of a dam may be environmentally costly rather than beneficial. A major concern with dam removal is the mobilization of accumulated sediments, as this can impact habitats downstream through sediment deposition (which may carry toxins, heavy metals or nutrients) and erosion. They also note that once a dam has been constructed, the original aquatic ecosystem has been changed, the new lentic ecosystems can support considerable aquatic biodiversity and that it cannot always be assumed that an ecosystem will return to its original state following the removal of a dam.

One potential cost of dam removals is the potential loss of novel refuges for aquatic organisms under ongoing climate change. Hydrological shifts have rarely been considered, yet, over the last 50 years, streamflow has decreased by 10-30 percent in North America, with most of this decrease due to climate forcing. Projections from climate change models suggest decreases in streamflow will continue in the future. Freshwater communities in many regions are structured by regular patterns of flooding and drying, with isolate pools providing ecological refuges between streamflow events. These refuges are critical to the periodic cycle of retreat and recolonization that characterizes non-perennial river systems. Decreased streamflow and increasing temperature as a result of climate change will affect the size, number, and connectivity of these refuges, with likely major impacts on freshwater biota, particularly

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<sup>4</sup> Beatty, Stephen, et al. "Rethinking Refuges: Implications of Climate Change for Dam Busting." *Biological Conservation*, vol. 209, May 2017, pp. 188-95. EBSCOhost, <https://doi-org.echo.louisville.edu/10.1016/j.biocon.2017.02.007>.



Figure 3

freshwater fishes. There is an increasing recognition that artificially created waterbodies may have an important role in creating refuge for aquatic organisms. Such artificial refuges have been identified as refuge habitat for a range of endangered aquatic organisms, including freshwater fishes, mollusks, and waterbirds. The reduced rainfall and flow conditions may be offset by maintaining existing dams and their associated impoundments. The ecological and conservation value of existing reservoirs is likely to increase in the future and this has not been sufficiently appreciated in the dam removal discourse.

The researchers note that there is an increased likelihood of novel invasions by aquatic species that possess physiological thresholds mismatched to current environmental conditions but matched to conditions likely to prevail under future climatic scenarios. Warmer water temperatures may also increase the transmission of exotic parasites and pathogens to native fish species. We may therefore expect more invasive fish species and greater impacts from these species in many regions due to climate change. The article notes that there are several examples of dams limiting the spread of invasive species and that eradicating alien species from reservoirs is possible and can directly facilitate their use as refuges by native fishes. The relative value of restoring connectivity for native species versus limiting the spread of invasive species requires careful consideration in decisions to remove dams or install fishways. The researchers note that dispersal of invasive species following barrier removal is not always predictable, which highlights the desirability of a sound biological and ecological understanding of the fauna (both native and alien) that will be impacted. In some cases, retaining or even creating barriers may help offset the increasing threat that invasive alien species pose to native biodiversity in changing climates.

Indiana University's 2023 Resilience Cohort and McKinney Climate Fellows of the *Environmental Resilience Institute* produced an informational webinar on October 11, 2022. The webinar noted climate change impacts in Indiana gathered by the Indiana Climate Change Impacts Assessment found that there is a 42 percent increase in amount of rain falling in heavy downpours. While some seasons in the region will get wetter, with winter expected to have a 16 to 20 percent increase and spring a 13 to 16 percent increase<sup>5</sup>. It is noted that more precipitation will be falling as rain, not snow, and will result in more runoff and higher stream flow. Some seasons will get drier, including the summer and fall, which showing slight declines, resulting in increased water demand from added heat and decreased streamflow. These impacts specific to the southern Indiana region are important to consider in the context of dam removal as the expected decrease in streamflow during the drier fall and summer seasons may be offset by maintaining existing dams and their associated impoundments.

#### *Elevated Turbidity*

A 2016 article from the Journal of American Water Resources Association states that unnaturally elevated concentrations of suspended sediment can have damaging ecological effects and consequences for human uses. The researchers find that fish can suffer a range of behavioral and physiological systems and human use impacts from elevated turbidity (the

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<sup>5</sup> 2023 Resilience Cohort and McKinney Climate Fellows, (October 2022). [Slide show; Environmental Resilience Institute]. Information Webinar. Indiana University.

measure of relative clarity of a liquid) including recreation, aesthetics, and safety, as well as increased drinking water costs. The study found that in 30 of the 32 states that have numeric criteria for regulating sediment in surface water prescribe criteria for turbidity and thus a major concern for dam-removal is the potential to exceed state turbidity regulatory standards.

The research team examined seven sites and paired turbidity data collected by the U.S. geological Survey using comparable instruments, methods, and sampling devices<sup>6</sup>. They observed turbidities at the sites to applicable state turbidity standards, evaluating the occurrence and degree of elevated turbidity pre-and-post removal by measuring estimated state threshold exceedance magnitude and duration. The key findings from the research conclude that the data examined show that the largest turbidity values downstream of dam removals were commonly at least an order of magnitude higher than the estimated state threshold. The cases where dam removal-induced turbidity exceeded storm-induced turbidity, either in magnitude or duration, appear to be associated with exceptional situations where large impoundments storing decades of annual sediment load are removed and/or with specific dam-removal methods. For example, the two Elwha River reservoirs together stored approximately 100 years of annual sediment load, nearly half of which was fine material.

### **Recommendations**

#### *Status Review of Species*

Based on the finding of the Economist article, "Science and Technology: Not so Fast" and the finding that removing a dam can do harm to riparian habitats home to endangered species, it is recommended that the areas to be impacted by the proposed dam removal are thoroughly examined through a status review of species. The Indiana Department of Natural Resources Indiana Division of Fish and Wildlife has compiled a list of Species of Greatest Conservation Need (November, 2020), which includes species categorized as State Endangered, State Special Concern, Federal Endangered, and Federal Threatened. This list consists of 157 species including 22 mammals, 53 birds, 22 fish, 27 mollusks, 12 amphibians, and 21 reptiles. This list should be used as the guiding document to identify whether species from this list, in addition to displaced species that now thrive in this area, could potentially be impacted by changes to the existing riparian habitat.

#### *Sediment Quality Assessment*

Sediment contamination can cause direct human exposure to chemicals, contamination of fish, and loss of economic and recreational opportunities. Due to the catastrophic nature of the removal of the Fort Edwards Dam on the Hudson River and near 30-year cleanup of the resulting Superfund site, it is recommended that laboratory testing of sediments is conducted to assess toxicity and bioaccumulation of chemicals at the site, as well as to predict potential chemical concentrations in aquatic dependent wildlife from exposure to contaminated sediments prior to and after cleanup. Should cleanup be deemed an acceptable method by the

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<sup>6</sup> Tullos, Desirée D., et al. "Synthesis of Common Management Concerns Associated with Dam Removal." *Journal of the American Water Resources Association*, vol. 52, no. 5, Oct. 2016, pp. 1179–206. EBSCOhost, <https://doi-org.echo.louisville.edu/10.1111/1752-1688.12450>

Figure 3

standards of the United States Environmental Protection Agency (EPA), biological, chemical, and geophysical procedures should measure and document the effectiveness of sediment remediation. The assessment should examine the amount of contaminants in sediment that can be absorbed by humans and models of how chemicals stay in the food chain for prediction of long-term changes in fish contaminant concentrations.

#### *Assessment Impacts from Invasive Species*

Given the documentation of the increases in abundance and density of the New Zealand mud snail coincident with dam removal, future monitoring of recovery from dam removal should include assessment of impacts from invasive species. The potential for dam removal to facilitate the spread of invasive species to previously unaffected streams has been considered regarding fish, especially Sea Lamprey in the Great Lakes system, but has often disregarded invertebrate species. A risk analysis should be conducted before dam removal regarding potential effects on colonization, range increase, and population increase of potential invasive species, and include the conclusions of such analysis in decision criteria regarding whether or not to remove individual dams.

#### *Climate Change Projections*

The influence of climate change on the impacts of dam removal have not been properly addressed as the net ecological value of artificial refuges such as dams may increase in drying regions. Research indicates that climate change may profoundly influence the value and impacts of dams in the future. Future climatic conditions dams underpinned by regionally specific data (as noted by Indiana University's Environmental Resilience Institute 2023 Resilience Cohort and McKinney Climate Fellows), should be incorporated in assessments of both positive and negative ecological impacts of dam removals. More research is required to quantify the existing ecological values of artificial impoundments and to predict how these values may change in the future. Especially in drying temperate streams where natural water refuges will be lost, the implication of climate projections on the value of dams and the impact of their removal requires consideration prior to removal.

#### *Water Quality Standard Review*

Due to the finding that dam removal can lead to large post-removal turbidity pulses, especially in sites examined holding approximately 100 years of annual sediment, it is recommended that the sediment load be evaluated for large quantiles of fine sediments that may result in elevated turbidities. The Indiana Department of Environmental Management and the U.S. EPA has recommended target levels<sup>7</sup> for water quality parameters of concern that are defined as the desired measured level of a water quality or habitat/biological parameter that a group has decided streams in the watershed should meet.

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<sup>7</sup> Water Quality Targets. (2022). Indiana Department of Environmental Management. <https://www.in.gov/Idem/nps/watershed-assessment/water-monitoring-and-you/interpreting-data/water-quality-targets/>

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Figure 3

**DNR SPECIES OF GREATEST CONSERVATION NEED**  
Indiana Division of Fish & Wildlife

Species of Greatest Conservation Need are those listed as State Endangered or State Special Concern

**State Endangered:** Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered or threatened by the federal government that occur in Indiana.

**State Special Concern:** Any animal species requiring monitoring because of known/suspected limited abundance or distribution or because of a recent change in legal status or required habitat.

**Federal Endangered:** Any species that is in danger of extinction throughout all or a significant portion of its range; designated with "FE".

**Federal Threatened:** Any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range; designated with "FT".

**M A M M A L S**

<u>State Endangered</u>	<u>State Special Concern</u>
<p>Grey Myotis FE Little Brown Myotis Northern Long-eared Myotis FT Indiana Myotis FE Tri-colored Bat Evening Bat Swamp Rabbit Franklin's Ground Squirrel Allegheny Woodrat</p>	<p>Smoky Shrew Pygmy Shrew Star-nosed Mole Southeastern Myotis Eastern Small-footed Myotis Silver-haired Bat Eastern Red Bat Hoary Bat Rafinesque's Big-eared Bat Plains Pocket Gopher Black Bear Least Weasel Badger</p>
<p><i>Myotis grisescens</i> <i>Myotis lucifugus</i> <i>Myotis septentrionalis</i> <i>Myotis sodalis</i> <i>Fermyotis subflavus</i> <i>Nycticeius humeralis</i> <i>Sylvilagus aquaticus</i> <i>Pollachius franklini</i> <i>Neotoma magister</i></p>	<p><i>Scorex fumus</i> <i>Scorex hoyi</i> <i>Condylura cristata</i> <i>Myotis austroriparius</i> <i>Myotis lbbi</i> <i>Lasiurus noctivagans</i> <i>Lasiurus borealis</i> <i>Lasiurus cinereus</i> <i>Oryzomys rafflesquill</i> <i>Geomys burbanki</i> <i>Ursus americanus</i> <i>Mustela rivalls</i> <i>Taxidea taxus</i></p>

**B I R D S**

<u>State Endangered</u>	<u>State Special Concern</u>
<p>Trumpeter Swan Ruffed Grouse King Rail Virginia Rail Common Gallinule Black Rail FT Whooping Crane FE Piping Plover FE Upland Sandpiper Rufa Red Knot FT Least Tern FE Black Tern American Bittern Least Bittern Black-crowned Night-Heron Yellow-crowned Night-Heron Northern Harrier Barn Owl Short-eared Owl Loggerhead Shrike Sage Wren Marsh Wren Henslow's Sparrow Yellow-headed Blackbird Golden-winged Warbler Kentland's Warbler Caribbean Warbler</p>	<p>Northern Bobwhite Black-billed Cuckoo Common Nighthawk Eastern Whip-poor-will Sandhill Crane American Golden-Plover Hudsonian Godwit Ruddy Turnstone Buff-breasted Sandpiper Short-billed Dowitcher American Woodcock Solitary Sandpiper Greater Yellowlegs Wilson's Phalarope Great Egret Osprey Sharp-shinned Hawk Mississippi Kite Broad-winged Hawk Long-eared Owl Peregrine Falcon Grasshopper Sparrow Western Meadowlark Worm-eating Warbler Black-and-white Warbler Hooded Warbler</p>
<p><i>Cygnus buccinator</i> <i>Bonasa umbellus</i> <i>Rallus elegans</i> <i>Rallus limicola</i> <i>Gallinula galeata</i> <i>Laterallus jamaicensis</i> <i>Grus americana</i> <i>Charadrius melodus</i> <i>Bairdmania longicauda</i> <i>Colinus caeruleus rufa</i> <i>Sterna anillarum</i> <i>Chlidonias niger</i> <i>Botaurus lentiginosus</i> <i>Ixobrychus exilis</i> <i>Nycticorax nycticorax</i> <i>Nyctanassa violacea</i> <i>Circus hudsonius</i> <i>Tyto alba</i> <i>Asio flammeus</i> <i>Lanius ludovicianus</i> <i>Ostothorus platensis</i> <i>Ostothorus palustris</i> <i>Centronyx henslowii</i> <i>Xanthocephalus xanthocephalus</i> <i>Vermivora chrysoptera</i> <i>Setophaga kirtlandii</i> <i>Setophaga oerelea</i></p>	<p><i>Colinus virginianus</i> <i>Coccyzus erythrophthalmus</i> <i>Chordeiles minor</i> <i>Antrostomus vociferans</i> <i>Antigone canadensis</i> <i>Pluvialis dominica</i> <i>Limosa haemastilla</i> <i>Arenaria interpres</i> <i>Callitis subruficollis</i> <i>Limodromus griseus</i> <i>Scolopax minor</i> <i>Tinga solitaria</i> <i>Tinga melanoleuca</i> <i>Phalaropus tricolor</i> <i>Ardea alba</i> <i>Pandion haliaetus</i> <i>Accipiter striatus</i> <i>Iduna mississippiensis</i> <i>Buteo platypterus</i> <i>Asio otus</i> <i>Falco peregrinus</i> <i>Ammodramus aavenarum</i> <i>Sturnella neglecta</i> <i>Helmitheros vermivorum</i> <i>Mniotilta varia</i> <i>Setophaga alba</i></p>

Figure 3

## FISH

State Endangered		State Special Concern	
Lake Sturgeon	<i>Acipenser fulvescens</i>	Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>
Redside Dace	<i>Clinostomus elongatus</i>	Alligator Gar	<i>Atractosteus spatula</i>
Pallid Shiner	<i>Hybopsis amnis</i>	American Eel	<i>Anguilla rostrata</i>
Greater Redhorse	<i>Moxostoma valenciennesi</i>	Pugnose Shiner	<i>Notropis anogenus</i>
Cisco	<i>Coregonus artedii</i>	Bigmouth Shiner	<i>Notropis dorsalis</i>
Hoosier Cavefish	<i>Amblyopsis hoosieri</i>	Longnose Dace	<i>Rhinichthys cataractae</i>
Bantam Sunfish	<i>Lepomis symmetricus</i>	Northern Madtom	<i>Noturus stigmosus</i>
Western Sand Darter	<i>Ammocrypta clara</i>	Trout-perch	<i>Percopsis omiscomaycus</i>
Variagate Darter	<i>Etheostoma varialeum</i>	Slimy Sculpin	<i>Cottus cognatus</i>
Channel Darter	<i>Percina copelandi</i>	Spotted Darter	<i>Etheostoma maculatum</i>
Gill Darter	<i>Percina evides</i>	Banded Pygmy Sunfish	<i>Elassoma zonatum</i>

## MOLLUSKS

State Endangered		State Special Concern	
Fanshell FE	<i>Cyprogenia stegaria</i>	Slippershell Mussel	<i>Alasmidonta viridis</i>
White Catpaw FE	<i>Epioblasma perobliqua</i>	Salamander Mussel	<i>Simpsonia ambigua</i>
Northern Riffleshell FE	<i>Epioblasma rangiana</i>	Elephantear	<i>Elliptio crassidens</i>
Snuffbox FE	<i>Epioblasma triquetra</i>	Spike	<i>Euryina dilatata</i>
Round Hickorynut	<i>Obovaria subrotunda</i>	Wavyrayed Lampmussel	<i>Lampsilis fasciola</i>
Sheepnose FE	<i>Pleurobasus cyphus</i>	Pocketbook	<i>Lampsilis ovata</i>
Clubshell FE	<i>Pleurobema clava</i>	Black Sandshell	<i>Ligumia recta</i>
Rough Pigtoe FE	<i>Pleurobema plenum</i>	Ohio Pigtoe	<i>Pleurobema cordatum</i>
Fat Pocketbook FE	<i>Potamilus capax</i>	Kidneyshell	<i>Ptychobranthus fasciolaris</i>
Rabbitsfoot FT	<i>Theliderma cylindrica</i>	Ebonyshell	<i>Reginaia ebenus</i>
Rayed Bean FE	<i>Villosa fabalis</i>	Purple Lilliput	<i>Toxolasma lividum</i>
		Texas Lilliput	<i>Toxolasma texasiense</i>
		Rainbow	<i>Villosa iris</i>
		Little Spectaclecase	<i>Villosa lienosa</i>
		Pointed Campeloma	<i>Campeloma decisum</i>
		Swamp Lymnaea	<i>Lymnaea stagnalis</i>

*It is illegal to take or possess live mussels and mussel shells of any species of native mussel from the waters of Indiana*

## AMPHIBIANS

State Endangered		State Special Concern	
Hellbender	<i>Cryptobranchus alleganiensis</i>	Mudpuppy	<i>Necturus maculosus</i>
Mole Salamander	<i>Ambystoma talpoideum</i>	Blue-spotted Salamander	<i>Ambystoma laterale</i>
Red Salamander	<i>Pseudotriton ruber</i>	Streamside Salamander	<i>Ambystoma barbouri</i>
Green Salamander	<i>Aneides aeneus</i>	Four-toed Salamander	<i>Hemidactylium scutatum</i>
Crawfish Frog	<i>Lithobates areolatus</i>	Blanchard's Cricket Frog	<i>Acris blanchardi</i>
Plains Leopard Frog	<i>Lithobates blaini</i>	Boreal Chorus Frog	<i>Pseudacris maculata</i>

## REPTILES

State Endangered		State Special Concern	
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	Eastern Box Turtle	<i>Terrapene carolina</i>
Eastern Mud Turtle	<i>Kinosternon subrubrum</i>	False Map Turtle	<i>Graptemys pseudogeographica</i>
Spotted Turtle	<i>Clemmys guttata</i>	Plains Gartersnake	<i>Thamnophis radix</i>
Blanding's Turtle	<i>Emydoidea blandingii</i>	Western Ribbonsnake	<i>Thamnophis proximus</i>
Ornate Box Turtle	<i>Terrapene ornata</i>	Rough Greensnake	<i>Opheodrys aestivus</i>
River Cooter	<i>Pseudemys concinna</i>	Red-bellied Mudsnsake	<i>Fancia abacura</i>
Butler's Gartersnake	<i>Thamnophis butleri</i>		
Copperbelly Water Snake FT <sup>1</sup>	<i>Nerodia erythrogaster neglecta</i>		
Kirtland's Snake	<i>Clonophis kirtlandii</i>		
Smooth Greensnake	<i>Opheodrys vernalis</i>		
Scarletsnake	<i>Cemophora coccinea</i>		
Southeastern Crowned Snake	<i>Tantilla coronata</i>		
Coltonmouth	<i>Agkistrodon piscivorus</i>		
Eastern Massasauga FT	<i>Sistrurus catenatus</i>		
Timber Rattlesnake	<i>Crotalus horridus</i>		

<sup>1</sup> Only the northern population of copperbelly water snake is federally threatened

Support nongame and endangered species conservation by donating to the Indiana Nongame Wildlife Fund. To donate, visit: [on.IN.gov/nongamewildlife](http://on.IN.gov/nongamewildlife)

Figure 4

*Example Rock Arch Structures:*

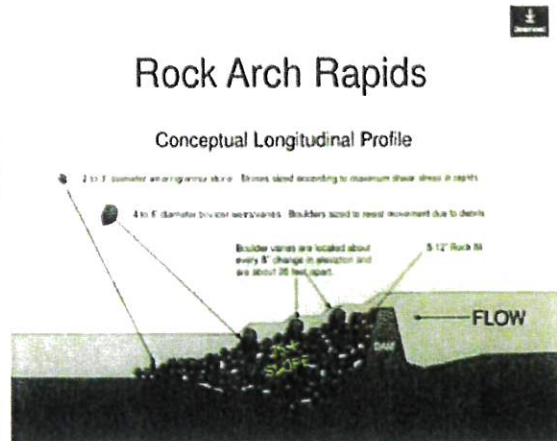


Figure 4

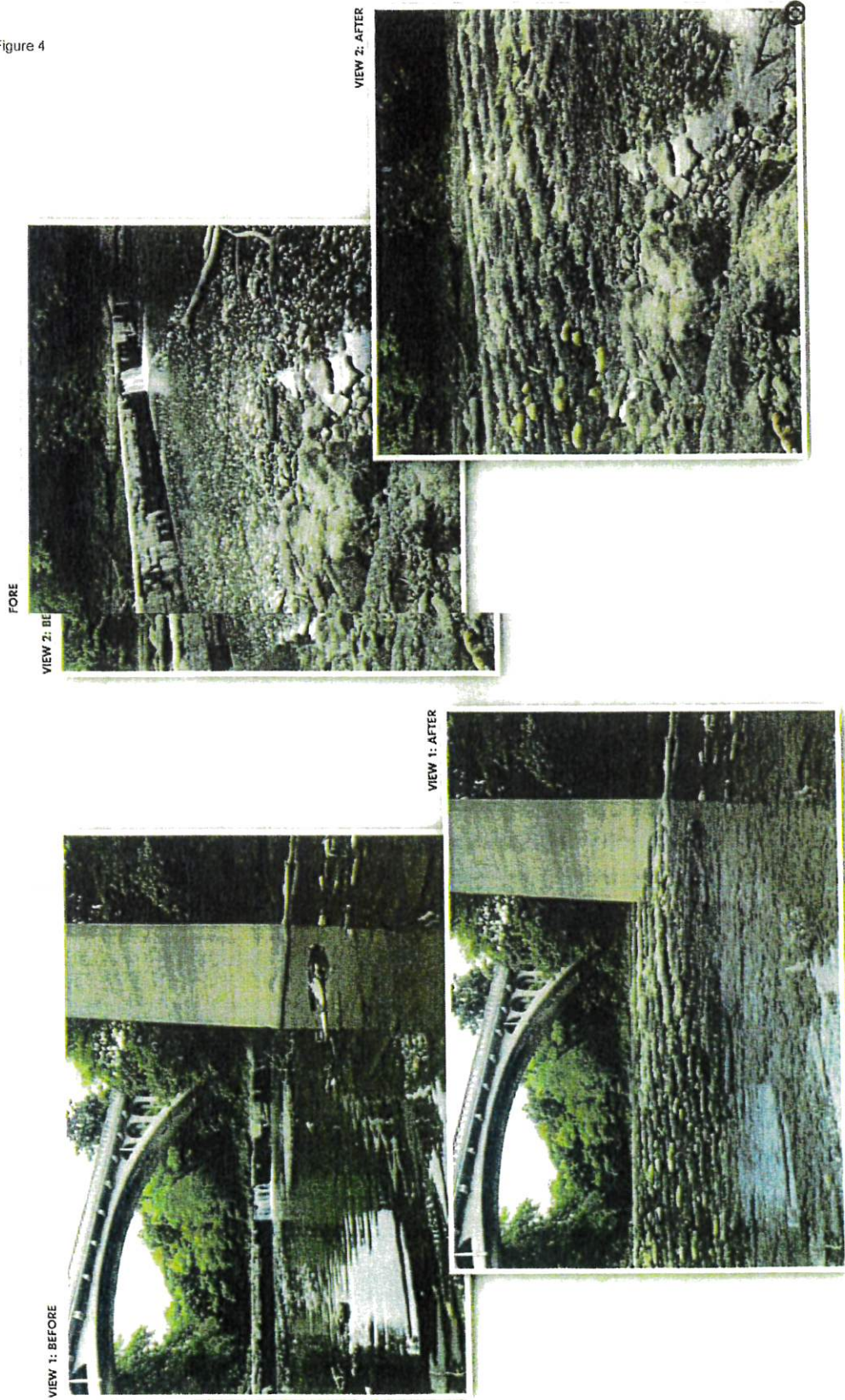




Figure 5

From: Wes E. Christmas <Wes.Christmas@clarkdietz.com>  
Sent: Wednesday, November 02, 2022 2:46 PM  
To: Mayor Gahan <mayorgahan@cityofnewalbany.com>

I spoke with some of our staff as well as Rob Huckaby of OHM (our partner on the storm water master plan project). Below are a couple thoughts based on a conceptual understanding of the situation:

1. With the removal of the dam, a moderate decrease in water surface elevation should be expected for about 3,000 feet of channel upstream of the low-head dam (during both baseflow and flooding conditions), with the greatest changes in surface occurring closest to the low-head dam. After a few flood seasons and as the stream evolves and adapts to the new conditions, areas near the former low-head dam could see a decrease in water surface elevation of 4-6 feet. The change in water surface elevation should be less the farther you move away from the low-head dam location. For low flow (or base flow) stream conditions, it appears changes in water surface elevation will be negligible a little over 3,000 feet upstream from the low-head dam. Note: Over the longer term, the channel will continue to evolve and sediment that had built up behind the low-head dam will be flushed and the flow channel is likely to continue to evolve.
2. In the short term, it's reasonable to anticipate a decrease in floatable days upstream of the low-head dam after its removal. For the longer term, as stated above the flow channel is likely to continue to change which could also impact the floatability and conditions for canoeing/kayaking.

Additionally, we have performed a cursory review of the Providence Mill Dam report compiled by C&B Burke Engineering, dated October 17, 2022. A couple quick takeaways:

- This study looked at the section of Silver Creek immediately upstream and downstream of the low-head dam near Providence Way. The stream was modeled with and without the low-head dam to estimate water surface elevations.
- The model looked at the 10-year, 50-year, 100-year, and 500-year storm events, and considered the Ohio River at a low elevation (i.e. No backwater from the river). Of important consideration: these storm events are very high flows and not something that would be considered suitable for recreation. (For a channel like this, flows most suitable for canoe/kayak may be on the order of 50 to 250 cubic-feet per second; the model looked at stream flows ranging from 16,300 CFS to 33,100 CFS.)
- For all storm events modeled, decreases in water surface elevation upstream of the low-head dam are projected. To better understand recreational impacts, much lower stream flows would have to be modeled, and the model would require more cross-sections that accurately detailed conditions below the water surface.
- The report was commissioned for Bose McKinney & Evans LLP, but it is unclear exactly the intent of the study, as again, only high stream flows were considered, which doesn't capture conditions the vast majority of the time.

Wes E. Christmas, PE, ENV SP  
Executive Vice President  
Clark Dietz, Inc. 120 W. Spring Street, Suite 400, New Albany, IN 47150  
c 812.305.1960

Figure 6

## Our Southern Indiana RDA READI Project Approval Methodology and Process



Tier One:  
Less than \$300,000

- Full Funding
- Total - \$828,800

Tier Two:  
\$300,000-\$5,000,000

- 60% of Funding
- Total - \$22,765,860

Funding amounts are based on the dollar amounts allocated in the Regional Development Plan.\*

Tier Three:  
Greater than \$5,000,000

- 52% ± of Funding\*
- Total - \$23,405,340

OUR SoIN RDA - Funding Methodology

Project Name & Location	\$ Amount in RDP	Tier 1 - < \$300,000 100%	Tier 2 - \$300K-\$5M	Tier 3 - \$5M+
Origin Park Phase I - Clark County & Town of Clarksville, IN	\$ 17,263,000.00			\$ 8,688,193.49
Commerce Connector, River Ridge to Hwy 31 (Clark County Airport)	\$ 5,831,800.00			\$ 2,935,052.24
READI Broadband Plan - Clark, Floyd Scott, Jefferson	\$ 100,000.00	\$ 100,000.00		\$ 2,969,376.21
Hanover College - Ivy Tech Veterinary Teaching Center	\$ 3,900,000.00			
Star Valley Destinations - Project 1 - Recreation	\$ 500,000.00		\$ 300,000.00	
South Monon Freedom Trail	\$ 4,070,000.00		\$ 2,442,000.00	
64 Innovation Corridor Project	\$ 5,500,000.00			\$ 2,763,062.57
Destination, Madison IN	\$ 3,949,750.00		\$ 2,369,850.00	
River Ridge Learning Center Early Childhood Education & Workforce Development Initiative	\$ 2,933,350.00		\$ 1,760,910.00	
Sellersburg Town Center District	\$ 4,000,000.00		\$ 2,400,000.00	
Salem Municipal Airport, Beeline Road Salem	\$ 253,800.00	\$ 253,800.00		
Lake Salinda Recreational Facility - Salem	\$ 280,000.00	\$ 280,000.00		
Hanover-Madison Connector Trail	\$ 1,600,000.00		\$ 960,000.00	
South Clarksville Marathon Site Development - Phase 1, 2 and 3	\$ 6,710,424.00			\$ 3,377,249.73
The ONE Fund	\$ 125,000.00	\$ 125,000.00		
Star Valley Destinations - Project 3 - Tourism	\$ 4,000,000.00		\$ 2,400,000.00	
Southern Indiana Youth Sports Complex - Scott County	\$ 5,300,000.00			\$ 2,667,405.75
Sellersburg Family Scholar House - Ivy Tech Community College	\$ 1,890,000.00		\$ 1,134,000.00	
Jeffersonville North Wastewater Treatment Plant Expansion	\$ 3,000,000.00		\$ 3,000,000.00	
City of Charlestown Wastewater Treatment Plant Improvements	\$ 3,000,000.00		\$ 3,000,000.00	
Align Southern Indiana Regional Trails	\$ 70,000.00	\$ 70,000.00		
WCEGP Housing on N. Shelby St				
The Scott Block Lofts - 301-311 West Main Street, Madison, IN				
Market Street Commons - Charlestown	\$ 5,000,000.00		\$ 3,000,000.00	
Depot Street Revitalization Project - Charlestown				
The Landings at River Ridge				
	<b>\$ 85,277,124.00</b>	<b>\$ 28,800.00</b>	<b>\$ 22,765,860.00</b>	<b>\$ 23,405,340.00</b>

\* If projects do not move forward and decline READI funds, remaining project funding (percentage and dollar amounts) could rise. We have already been informed of several projects that are likely not going to seek READI funds. Percentage of Funds are subject to remaining dollar amounts unobligated.

Figure 7



# 2023 Resilience Cohort and McKinney Climate Fellows

*Informational Webinar*  
October 11, 2022



INDIANA UNIVERSITY  
**ENVIRONMENTAL RESILIENCE  
INSTITUTE**

Figure 7

# Overview of the Environmental Resilience Institute



*Our Vision: An environmental resilience revolution*

*Our Mission: To co-create environmental resilience and climate solutions by integrating research, education, and community.*



ENVIRONMENTAL RESILIENCE INSTITUTE



Figure 7

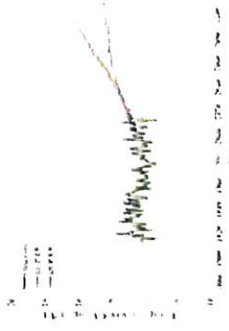
## Climate Change Impacts in Indiana

Climate change poses a threat to Hoosier communities. A **resilient Indiana** is one that takes **proactive steps** to reduce the threats and vulnerabilities associated with climate change.

Step 1: **Reduce the threat**

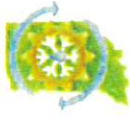
Step 2: **Avoid the impacts**

Step 3: **Prepare for the unavoidable**



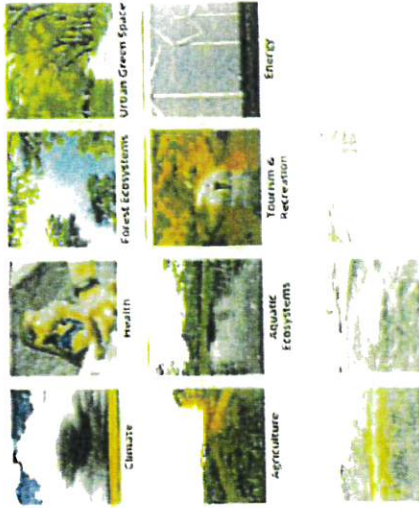
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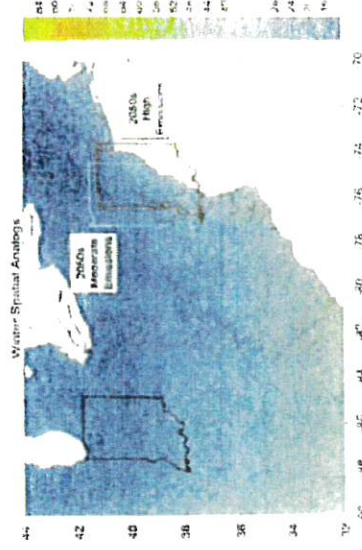
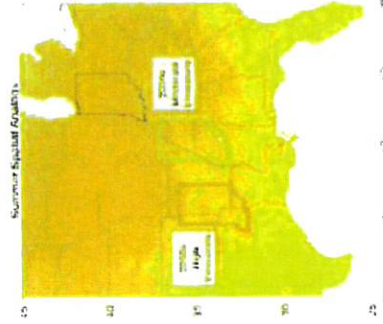
WCCB

Indiana Climate Change  
Impacts Assessment



### Seasonal Analyses

Based on seasonal average temperature and precipitation



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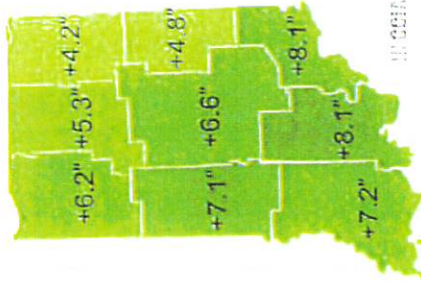
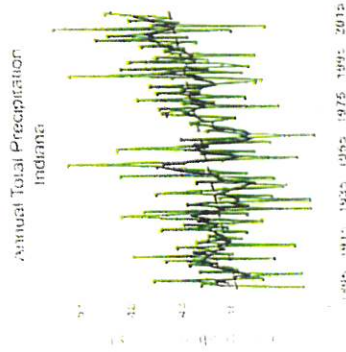


Figure 7

# Climate Change Impacts in Indiana

42% increase in amount of rain falling in heavy downpours

**Some seasons will get wetter**



↑

WINTER: 16 to 20% increase  
 SPRING: 13 to 16% increase

- More falling as rain, not snow
- Expecting more runoff & higher streamflow

**Some seasons will get drier**

↓

Summer & fall show slight declines,  
 with less certainty in the projections

- Increased water demand from added heat
- Decreased streamflow



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Figure 7



Zionsville, IN



Fishers, IN

### Resilience Cohort

- Advances local government climate preparedness
- Assess → Plan → Implement w/ peer network
- Technical assistance, equity coaching
- 2019-2022: more than 40 local governments

### McKinney Climate Fellows

- Builds host organization capacity
- Governmental, private, non-profit hosts
- Sustainability workforce development
- 2017-2022: more than 160 fellowships



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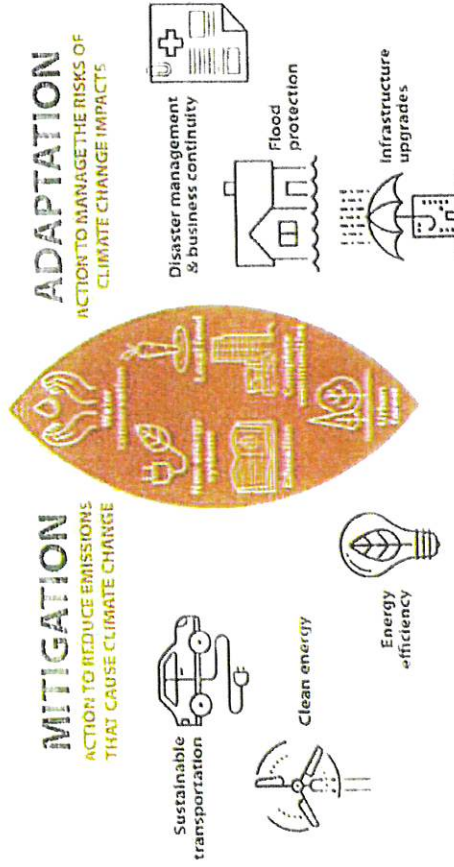


Figure 7

## Pathways to resilience

Planning for climate change involves two equally important pathways: climate change mitigation and climate change adaptation.

All climate planning strategies should be co-developed with the community, centering equity in their approach.



Source: [www.mrgscience.com](http://www.mrgscience.com)



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Figure 7



- **Climate Risk and Vulnerability Assessment (CRVA)**, May – August 2023
  - Launch project and convene task force
  - Work with community and ERI to assess past and future climate trends and risks
  - Identify and prioritize vulnerabilities
  - Finalize vulnerability assessment (or update an existing assessment)
- **Climate Resilience Plan (aka Climate Adaptation Plan)**, September 2023 – April 2024
  - Work with community and ERI to identify resilience strategies
  - Prioritize equity in engagement and strategy development
  - Draft climate resilience plan (or update an existing plan)
  - Gather community and stakeholder feedback
  - Finalize and adopt plan



### Participant benefits:

- *Step-by-step guidance* through the vulnerability assessment and climate resilience planning process via 10 training webinars and access to tutorials, guides, and other resources
- *One-on-one technical assistance* and support from ERI and Geos Institute, a nonprofit organization specializing in climate resilience planning services
- *Targeted assistance* to integrate federal funding opportunities with resilience plan strategies
- Access to *equity training and coaching*
- Access to document *translation services* to increase accessibility
- An *Indiana-specific cohort* and network to facilitate peer learning
- *Marketing communications support*



### Participant costs:

- **\$2,000 program cost** (a substantially reduced rate thanks to the McKinney Family Foundation and other generous donors)
- **Lead staff** who can dedicate an average of **15-20 hours per month** throughout the program (this hourly commitment assumes the additional support of a McKinney Climate Fellow; if not hosting a Fellow, the hourly commitment will be higher)
- **\$2,000 student scholarship contribution** if hosting a Climate Fellow, and provision of a computer, workspace, and phone for the Fellow



Figure 7

### Additional details:

- *Hoosier Resilience Index Readiness Assessment*
- *Supports climate resilience planning*

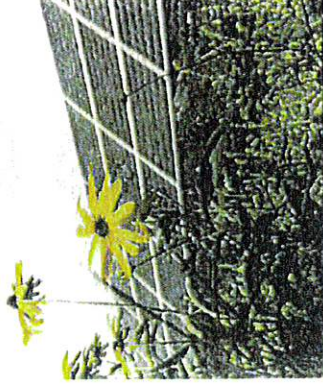


### How to apply:

- *Visit [eri.iu.edu](http://eri.iu.edu) and navigate to the Resilience Cohort or MCF webpages for more information and links to application*
  - *[Who We Work With >> Local Governments >> Resilience Cohort](#)*
- *Schedule a meeting with Matt Flaherty ([flahertm@iu.edu](mailto:flahertm@iu.edu)) or Anagha Gore ([anagore@iu.edu](mailto:anagore@iu.edu)) to discuss your interests and needs*
- *Deadline: Friday, Nov. 4, 2022*



## Frequently Asked Questions



1. *Can we host a McKinney Climate Fellow even if we do not want to participate in the Resilience Cohort?*
  - o Yes, you can apply to host a Fellow for your own climate or sustainability project. The application can be found on the [McKinney Climate Fellow web page](https://www.climate.fsu.edu/webpage/).
2. *Can we pursue only the Climate Risk and Vulnerability component?*
  - o Yes. You can apply to be a Resilience Cohort participant only for the CRVA component through summer 2023.
3. *Can we pursue only the Climate Resilience Plan component?*
  - o The CRVA is a prerequisite to the CRP. Participants may opt in for the CRP component only if they already have a detailed CRVA in place. Participants may reach out to Matt Flaherty and Anagha Gore to determine eligibility.

Figure 7



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