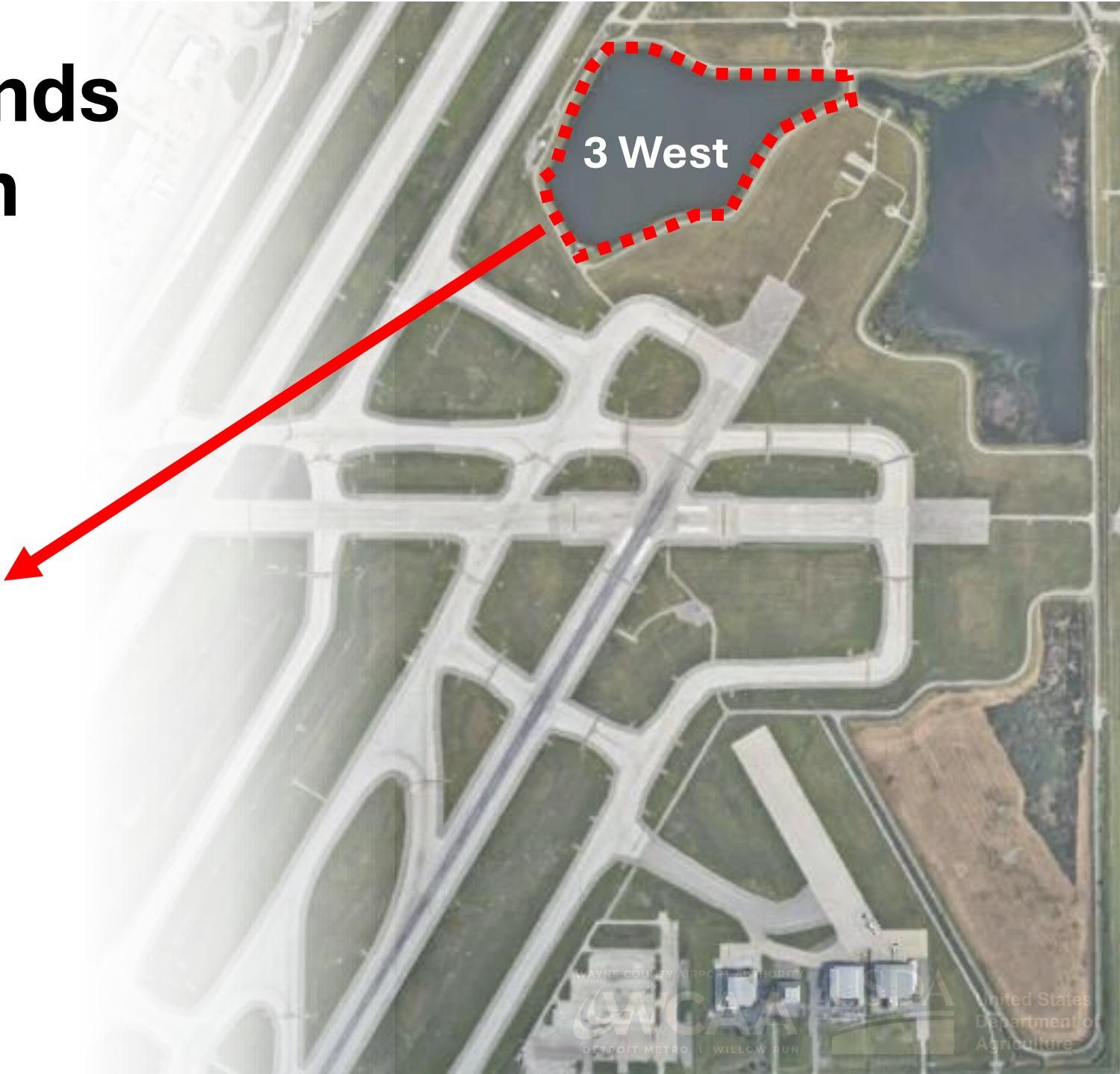


Goldfish Problem at DTW

Steven Gurney
DTW Wildlife Team, WCAA
April 10th, 2025



DTW's detention ponds are full of goldfish



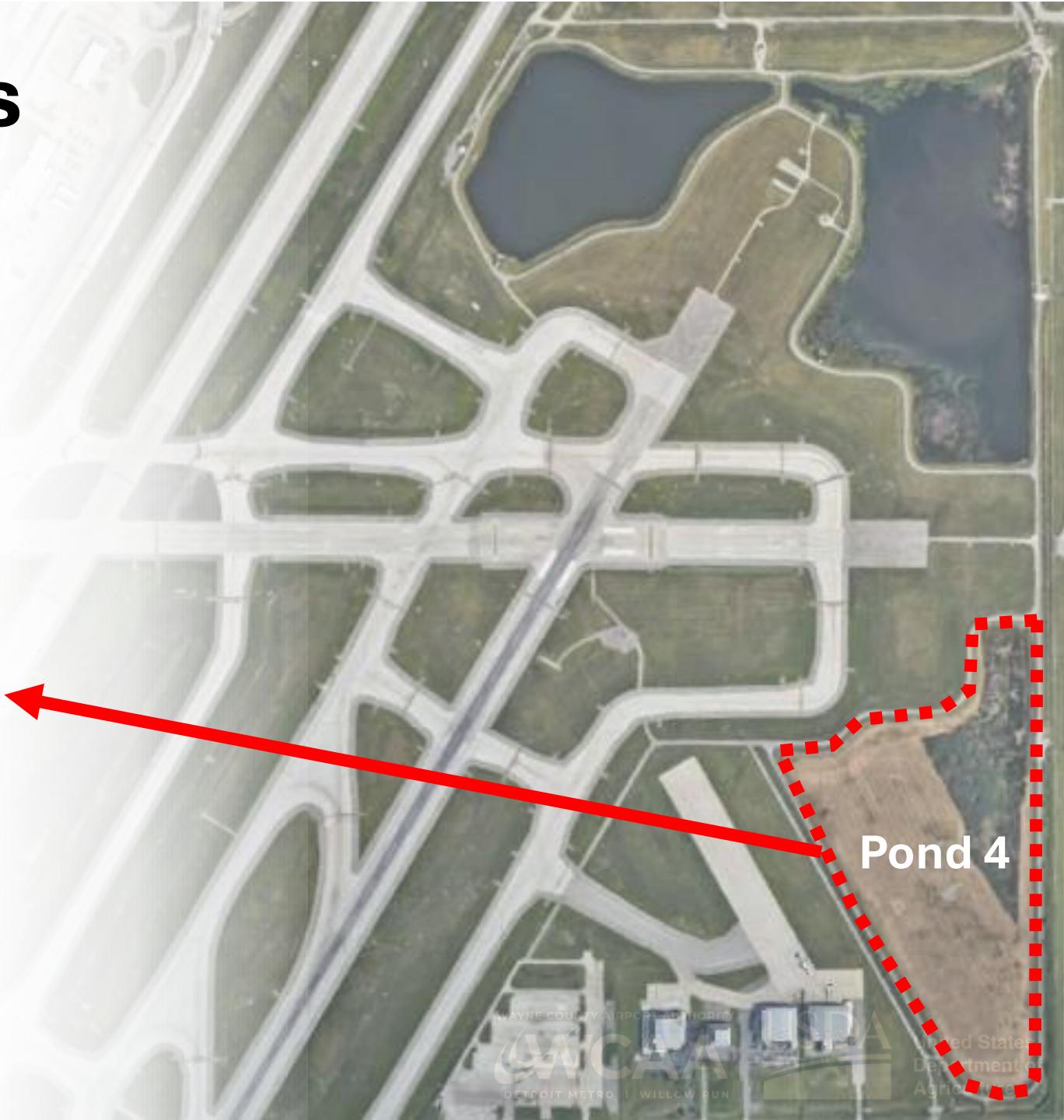
DTW's detention ponds are full of goldfish



Note the presence of suspected invasive snail species.



DTW's detention ponds are full of goldfish



We used a comprehensive approach to confirm fish ID

(Goldfish commonly confused with other carp species).

We used a comprehensive approach to confirm fish ID

Qualitative <i>(Observable)</i>	Quantitative <i>(Countable & Measurable)</i>
Olive-bronze color; light underbelly	5 – 8", but some 12"+ (127 – 203 mm, some 300 mm)
Football-shaped body; rounded stomach	
Large scales	25 – 31 scales along lateral line ($n = 29$)
Lack of barbells on upper jaw; no scales on head	
Large eyes relative to body	15 – 21 dorsal fin rays ($n = 19$)
Long dorsal fin; forked tail fin	
Serrated spines on first few rays of dorsal & anal fins	5 – 6 anal fin rays ($n = 6$)
Schooling behavior (indirect observation)	



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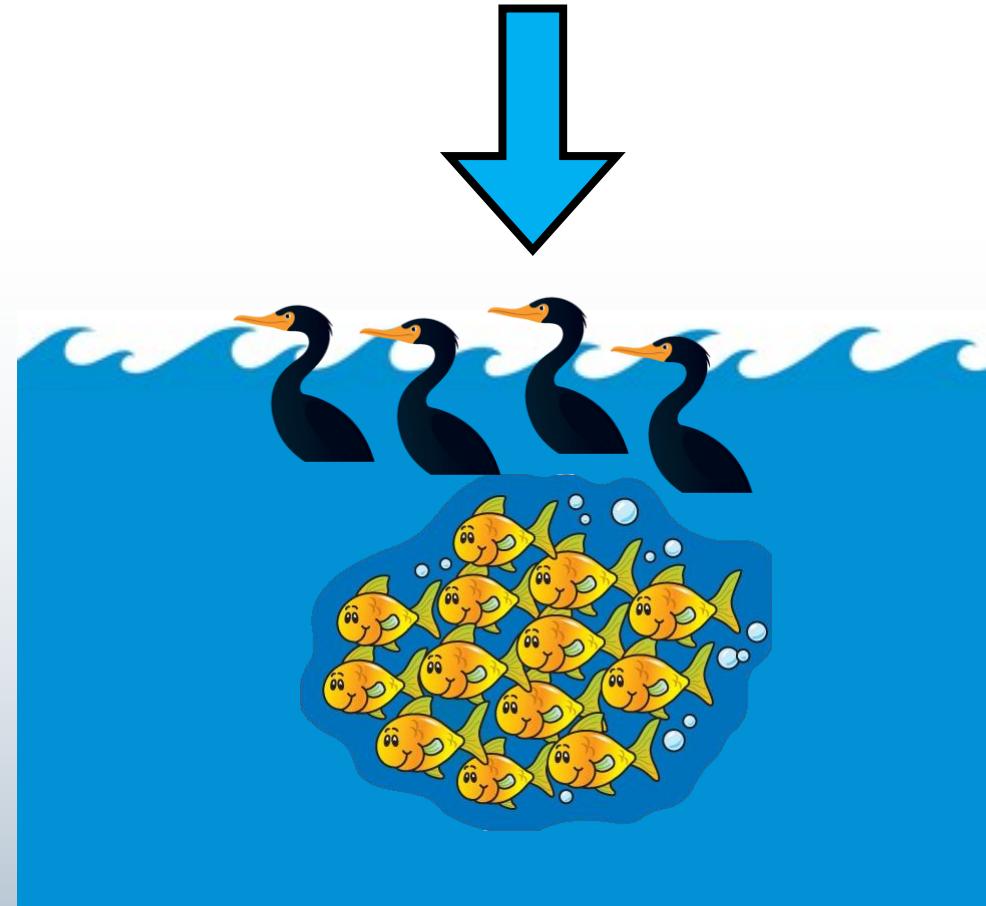


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Cormorants hunting fish at DTW.



We used a comprehensive approach to confirm fish ID

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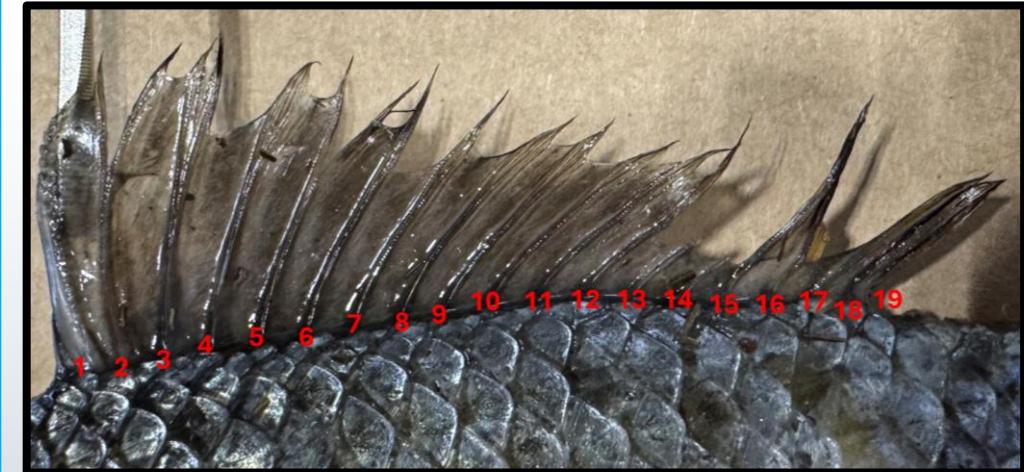
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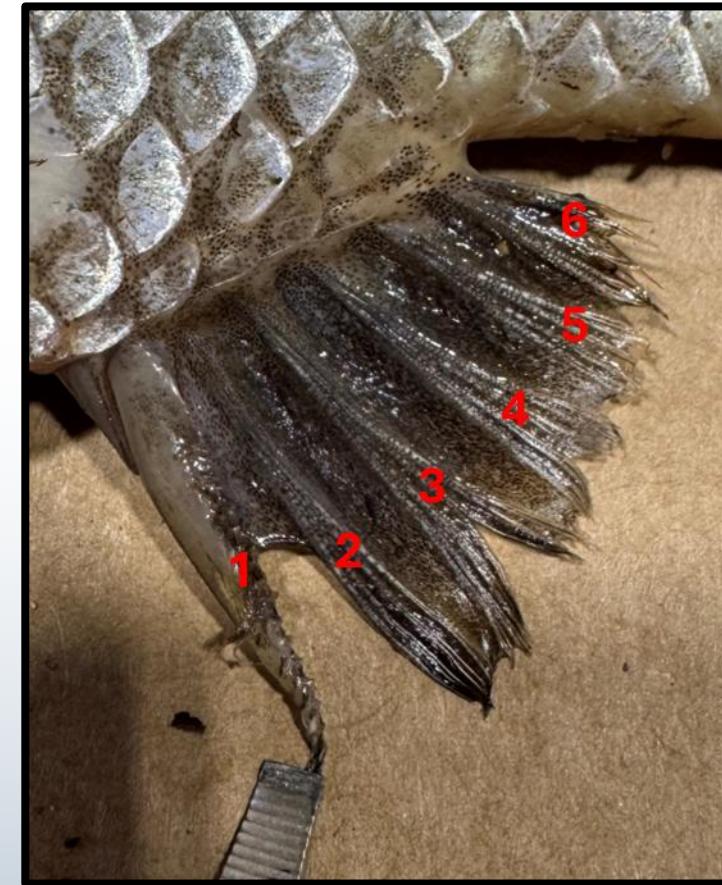
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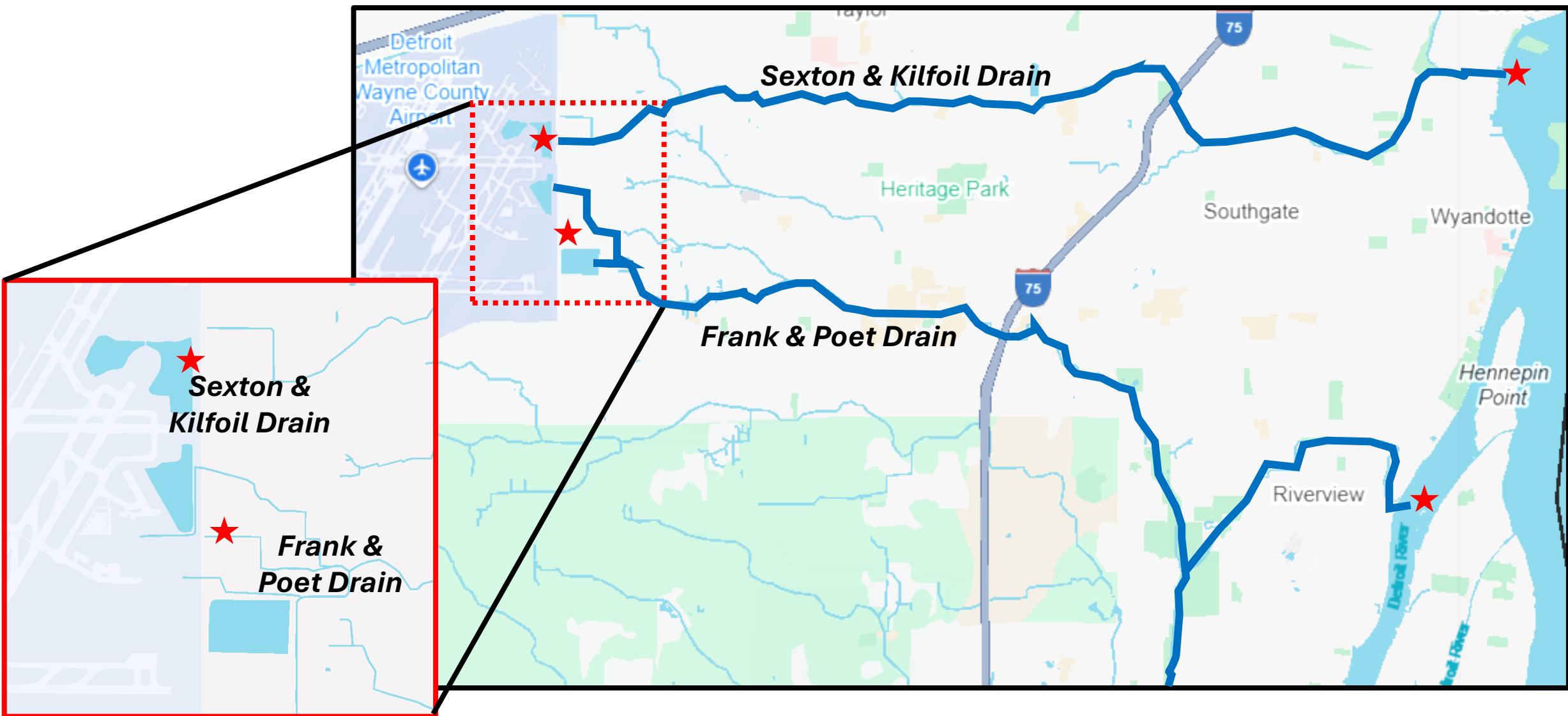


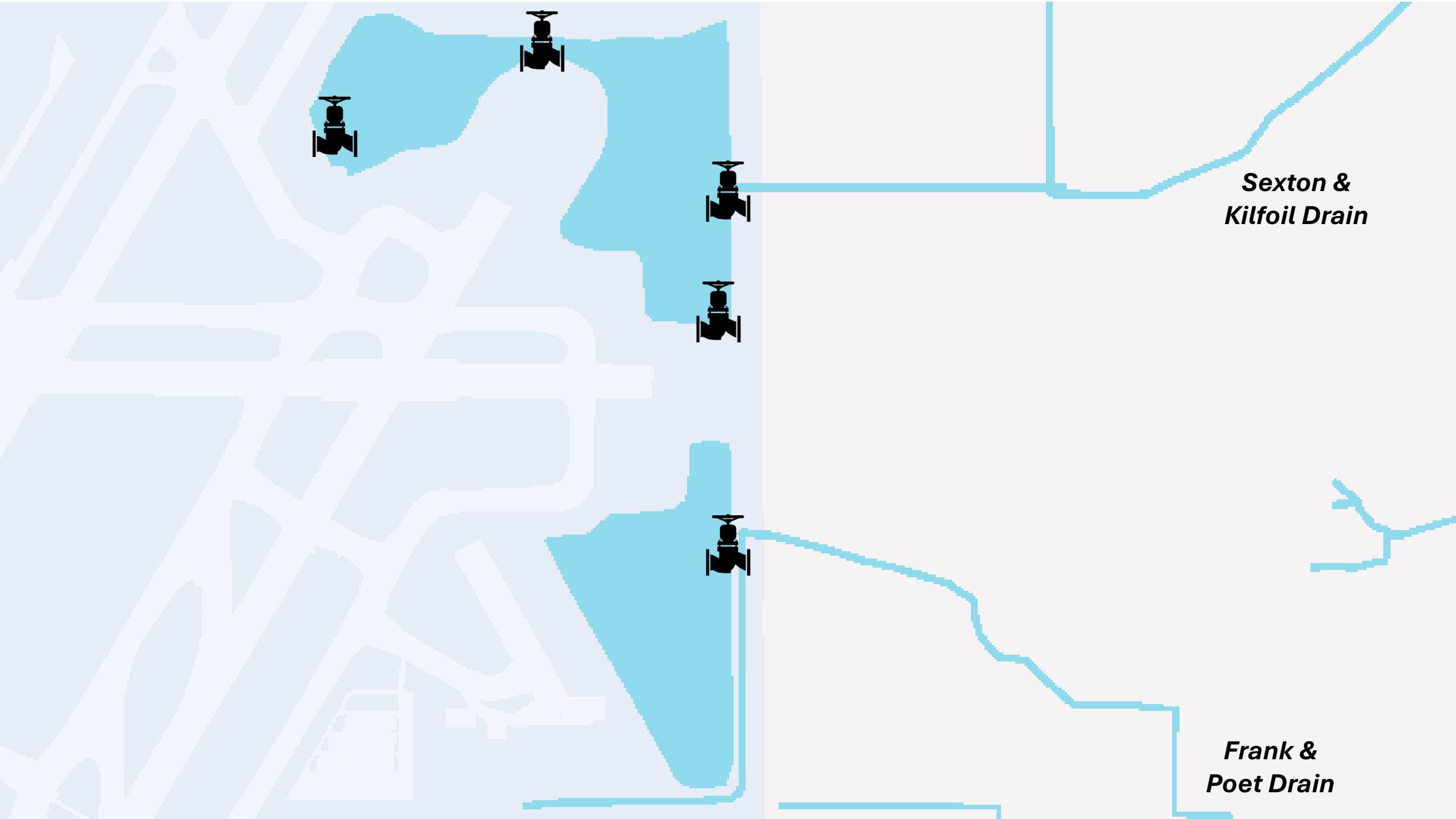
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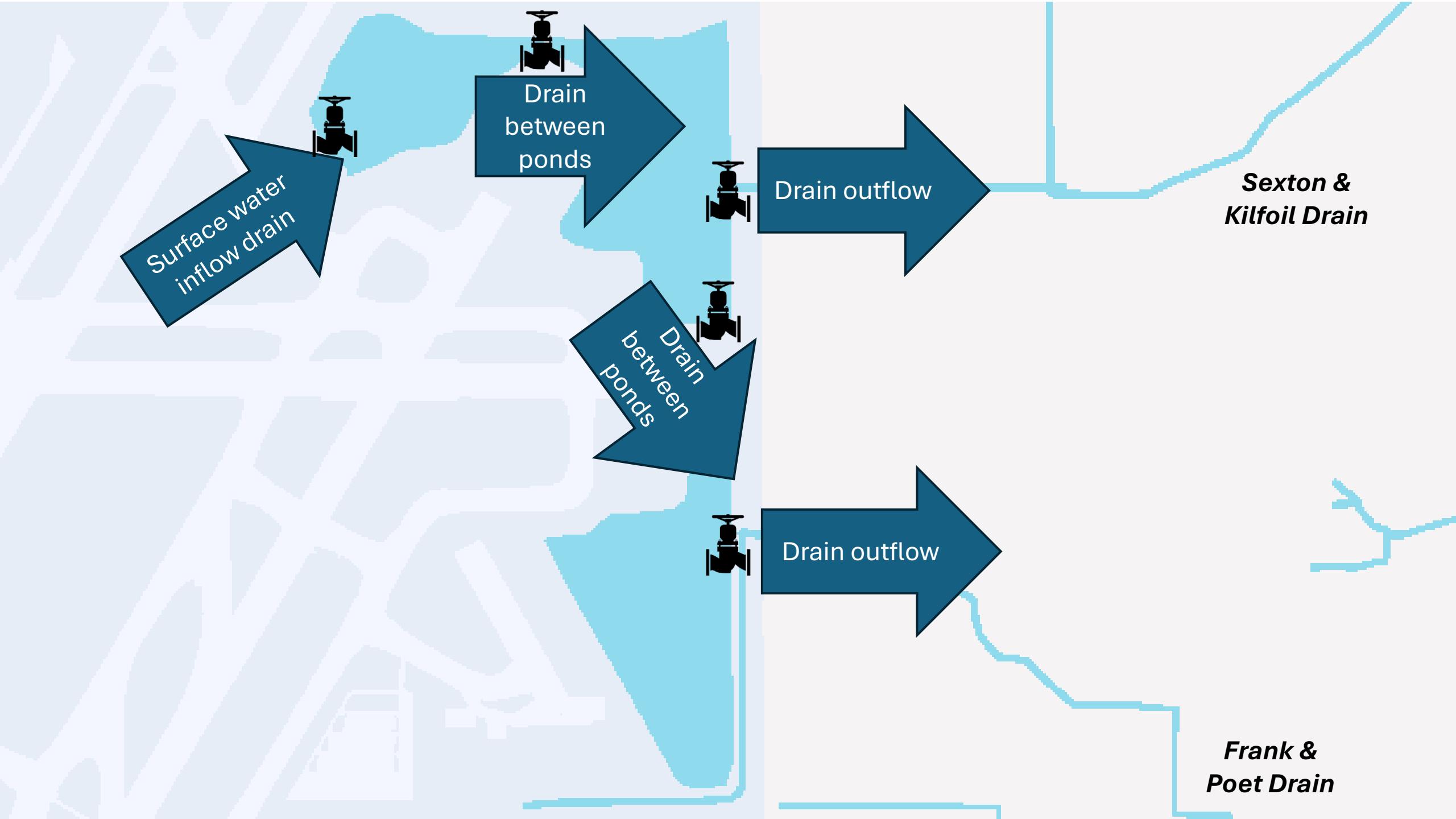
DTW is a point source for drains that dump into the Detroit River → Great Lakes





**Sexton &
Kilfoil Drain**

**Frank &
Poet Drain**

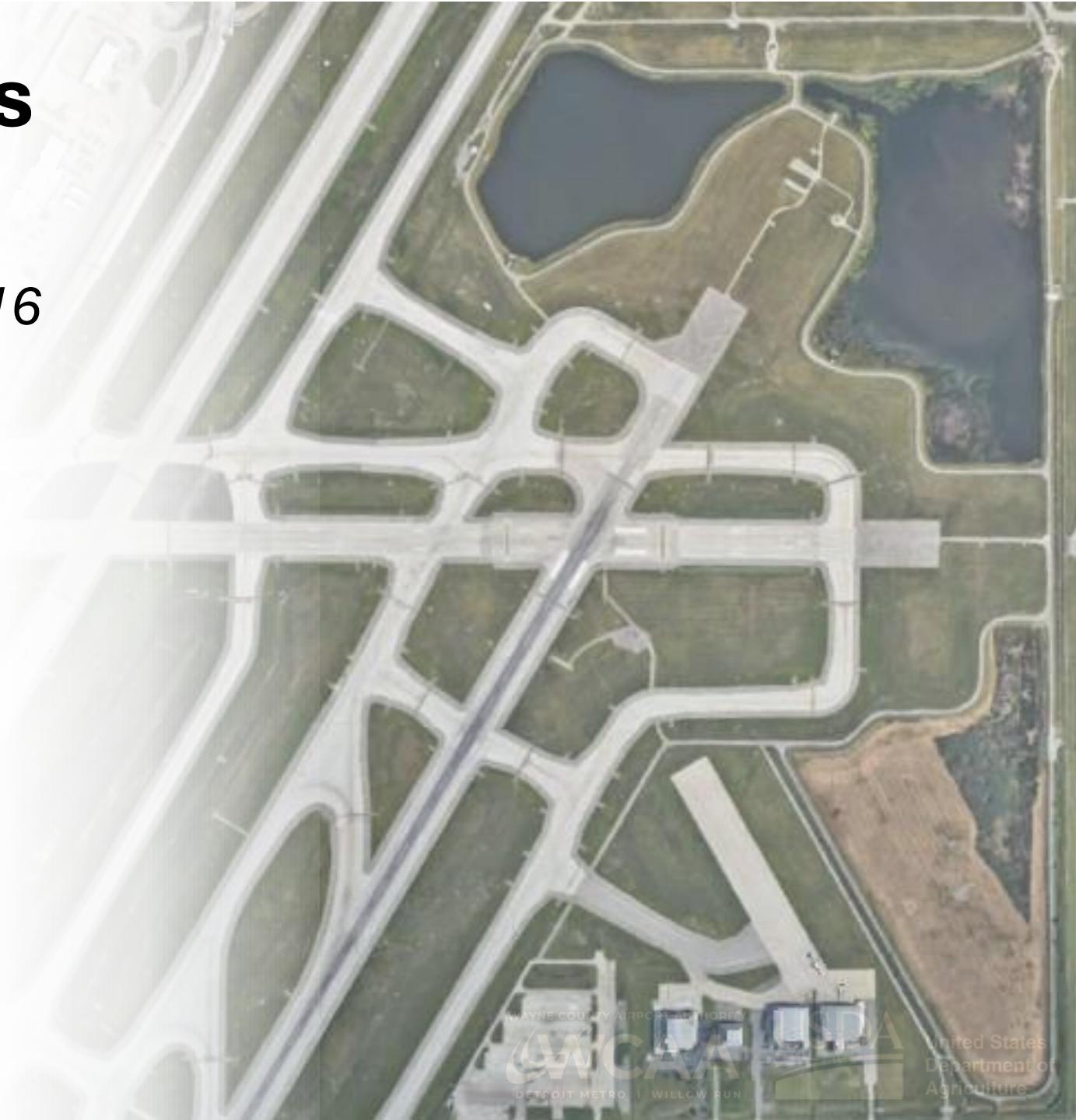
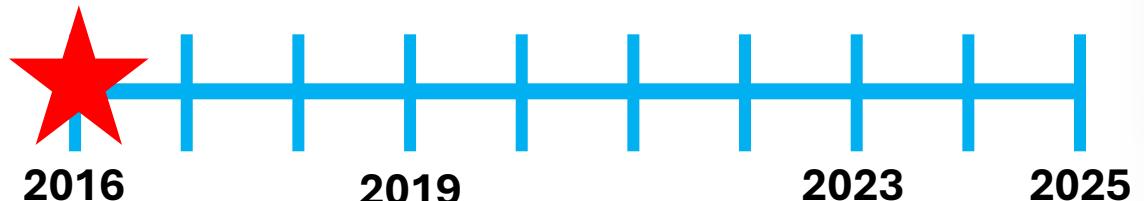


Take-Home Messages

1. DTW's ponds are full of invasive goldfish, and it has been unmanaged for 10 years.
2. Fish management better aligns with WCAA goals, and will benefit safety, liability, sustainability, and permit compliance.
3. Fish-eating birds are a strong driver of damaged aircraft, and DTW's damaging strike rate has been higher than average for 3 years.
4. The Wildlife Team has made continuous efforts to address the problem.
5. The Wildlife Team has limited tools in their toolbox, and fish management is an unutilized and much needed tool at DTW.

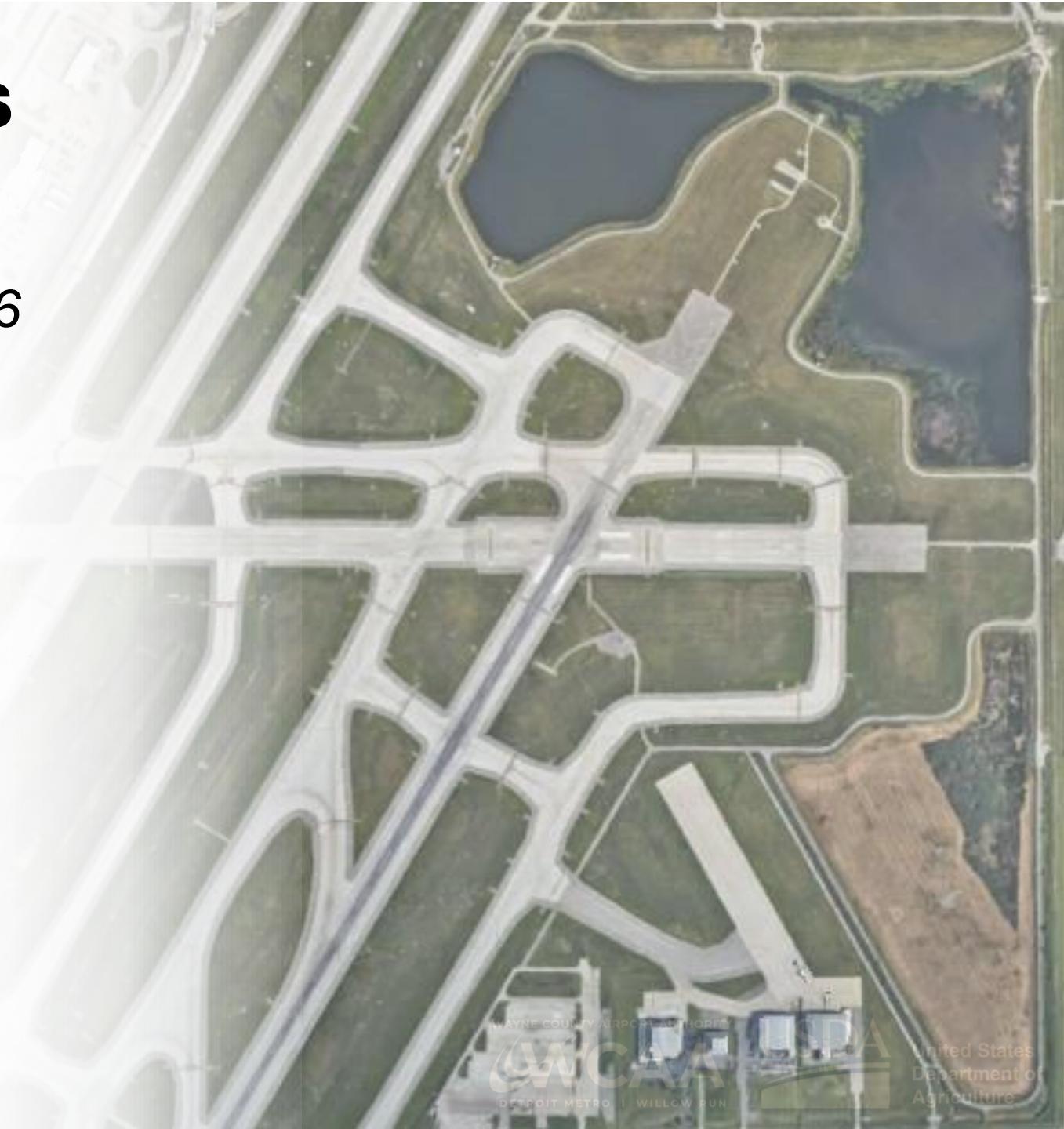
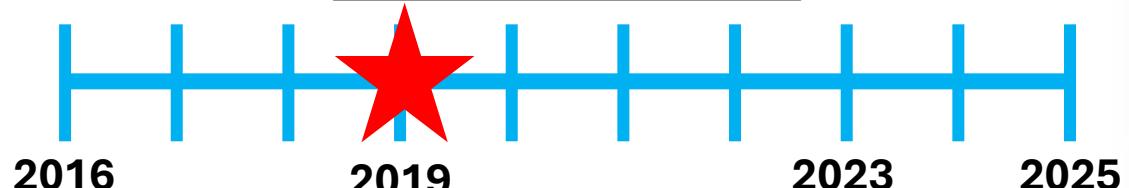
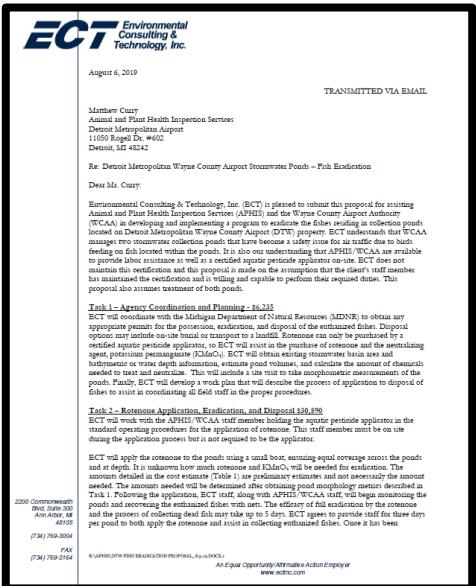
DTW's detention ponds are full of goldfish

- *First documented winter 2015 - 2016*



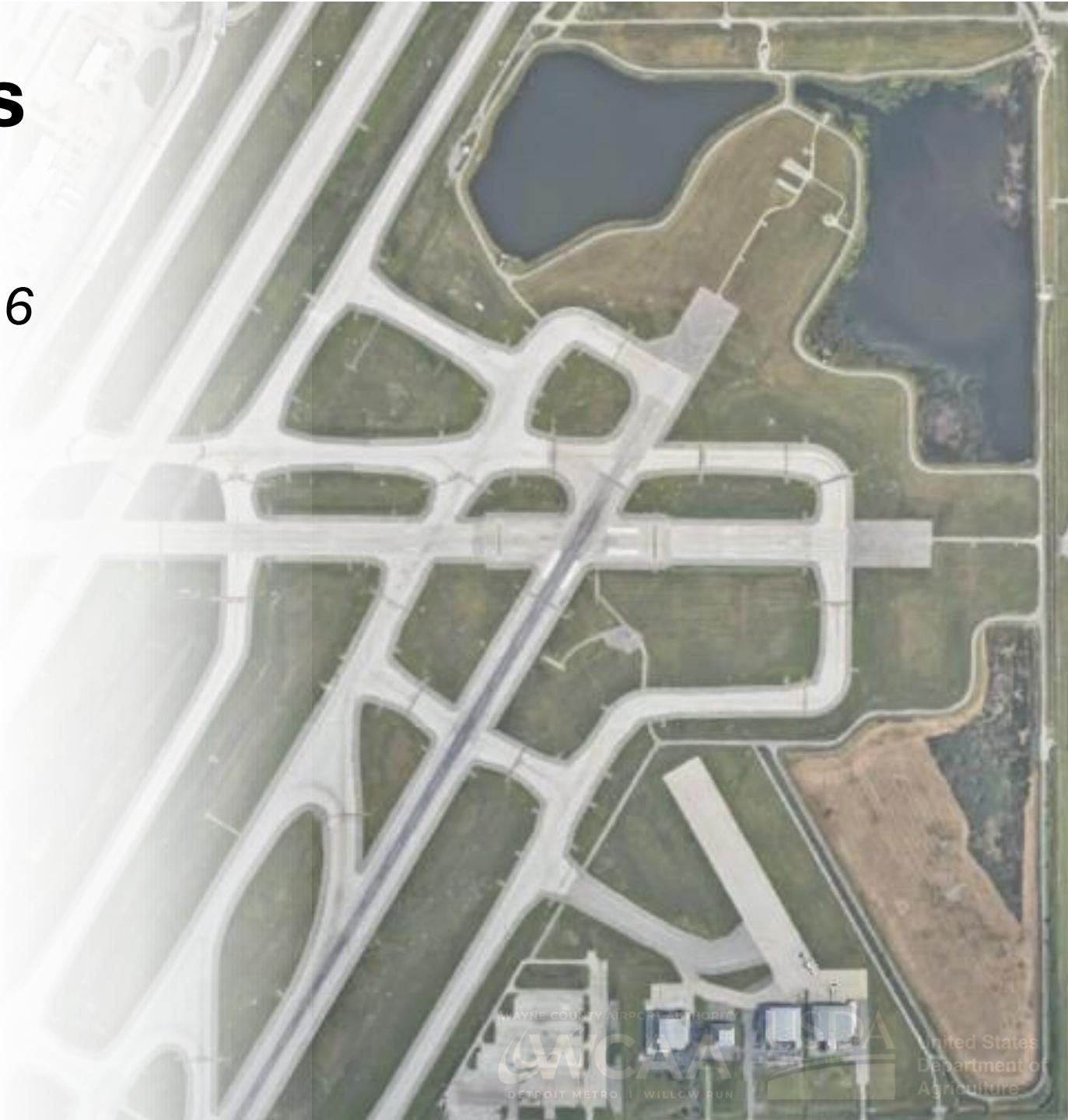
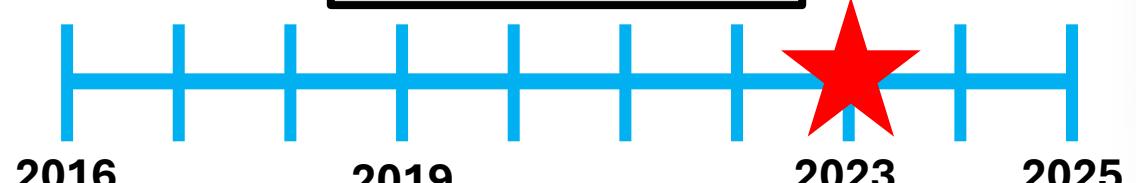
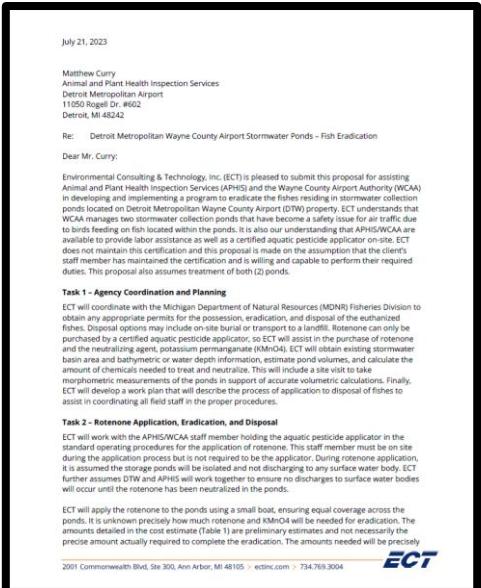
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- First documented winter 2015 - 2016
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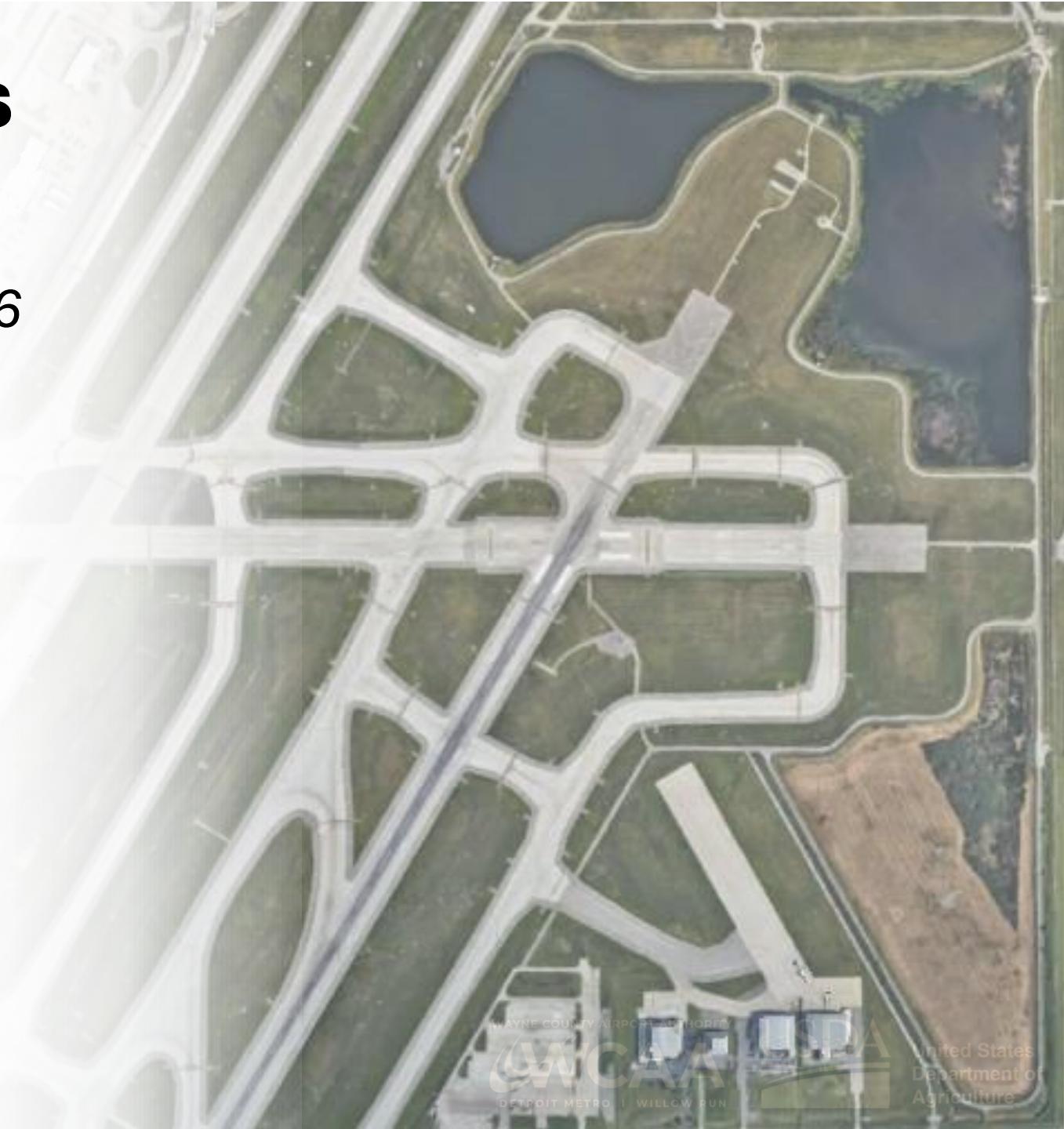
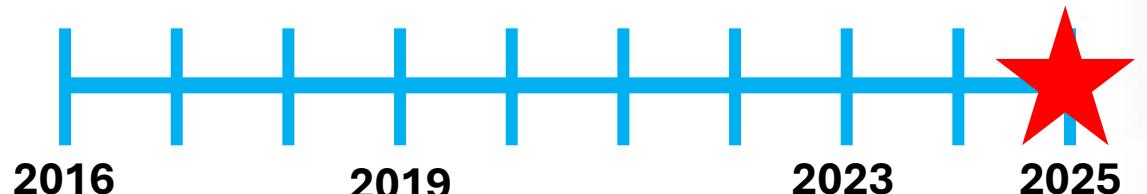
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- First documented winter 2015 - 2016
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DTW's detention ponds are full of goldfish

- *First documented winter 2015 - 2016*
 - *Multiple proposals, no action*
 - *~10 years of no management*



DTW's detention ponds are full of goldfish

- *Recent samples collected
following 2025 winterkill*



Goldfish are an invasive species that threaten ecosystem health

Reproduce quickly

- At 3 – 4 years
- Breed once per month, Feb - Jun

Reproduce in large numbers

- 2000 to 380000 young

Tolerate extreme conditions

- Live without oxygen up to 5 months
- Survive in water that freezes solid
- Can inhabit highly polluted waters

Compete with native fish

- Threatens biodiversity

Feeding behavior

- Impact water quality, turbidity
- Kill vegetation
- Oxygen depletion, algal blooms



Goldfish are an invasive species that threaten ecosystem health

Reproduce quickly

- At 3 – 4 years
- Breed once per year

Reproduce in large numbers

- 2000 to 380000 eggs per female

Tolerate extreme conditions

- Live without oxygen for up to 2 hours
- Survive in water temperatures from 32°F to 86°F
- Can inhabit highly polluted waters

Compete with native species

- Threatens biodiversity

Feeding behavior

- Impact water quality, turbidity
- Kill vegetation
- Oxygen depletion, algal blooms

Problems amplified by
larger goldfish
populations



BEWARE: FERAL GOLDFISH IN DANGER OF INVADING THE GREAT LAKES



MICHIGAN STATE UNIVERSITY

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Resources

No silver lining: Invasive goldfish in the Great Lakes

By
G

People

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NEWS

'A reality': Giant goldfish wreaking havoc in Great Lakes

The New York Times

Once They Were Pets. Now Giant Goldfish Are Menacing the Great Lakes.

Released into the wild, the humble goldfish can grow to a monstrous size and destroy habitats for native species. Canadian researchers are tracking the fish, so that they might be culled.

PBS NEWS HOUR

How massive, feral goldfish are threatening the Great Lakes ecosystem

May 23, 2024 6:25 PM EDT

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Michigan Environment Watch

Feral goldfish are menacing Great Lakes: We're going to need a bigger bowl



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SMART NEWS

Giant Goldfish Are Bad News for the Great Lakes

Researchers are tracking invasive goldfish—which often, were once kept as pets—in Lake Ontario to determine how best to manage them



BEWARE: FERAL GOLDFISH IN DANGER OF INVADING THE GREAT LAKES

SUN 54°

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No silver lining: Invasive
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By Connor Shelly, Michigan Sea Grant; and Rochelle S. G. Grant and Michigan State University Extension - February 2024

HUMAN INTEREST > ANIMALS

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How massive, feral goldfish are threatening the Great Lakes ecosystem

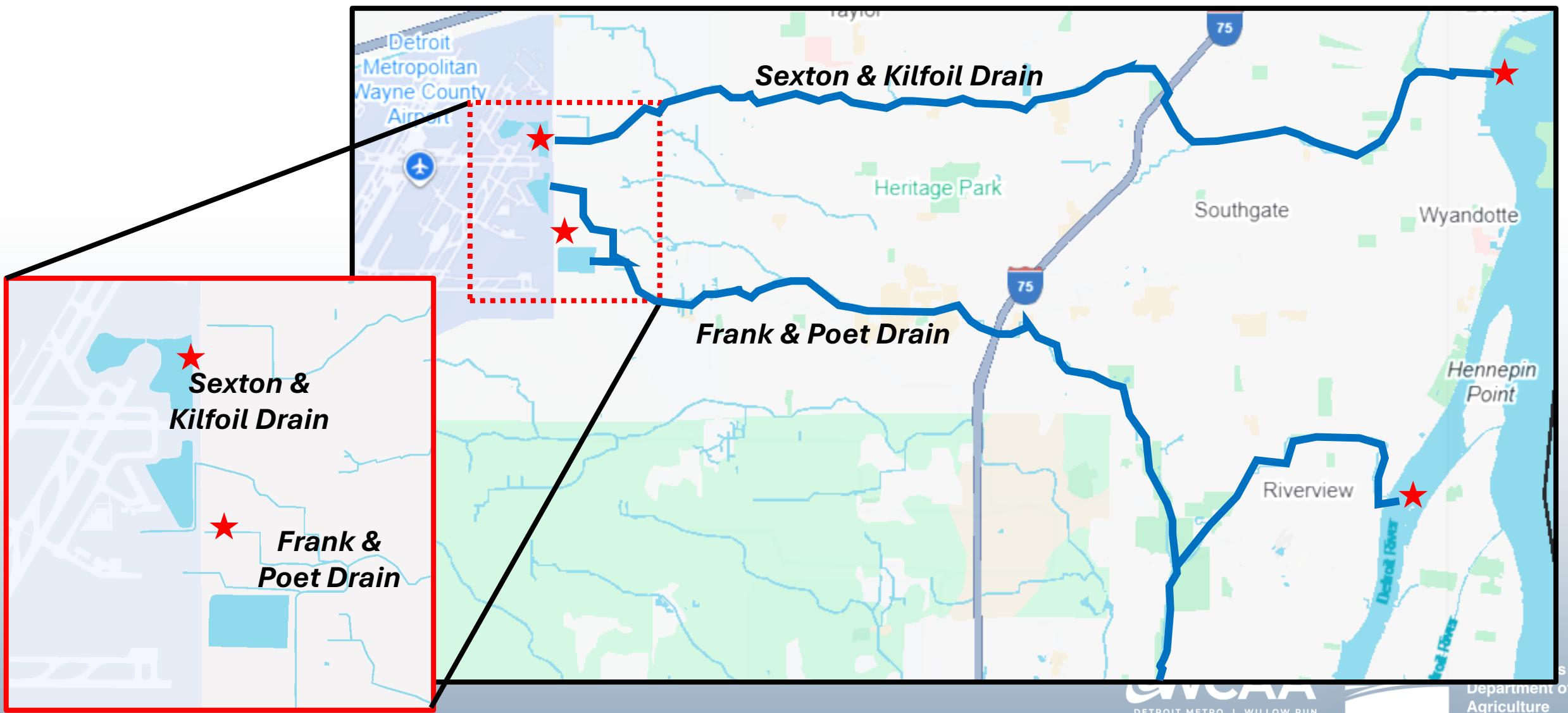
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WCAAW USDA
DETROIT METRO | WILLOW RUN
United States Department of Agriculture

DTW is a point source for drains that dump into the Detroit River → Great Lakes



DTW is a point source for drains that dump
into the Detroit River → Great Lakes

DTW may be
discharging goldfish
into public waters



Fish management better aligns with DTW goals

Safety

- Aviation, public
- Fish attract some of the *most hazardous* bird species

Liability

- Airport operators must mitigate bird hazards to avoid liability and criminal charges
- Example → Air France ingested geese at JFK
 - Substantial damage, emergency landing
 - Port Authority of NY & NJ sued, \$5.3 million → Negligence



Damaging gull strike at DTW.

Fish management better aligns with DTW goals

Safety

- Aviation, public
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Sustainability

- WCAA's Sustainability Program → Reduce environmental impacts
- Invasive species have a *negative impact on the* environment; inside & outside of DTW



Fish management better aligns with DTW goals

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- Aviation, public
- Fish attract some of the most hazardous bird species

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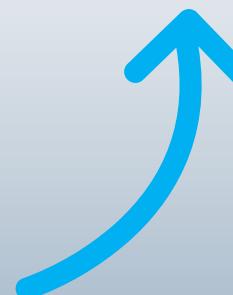
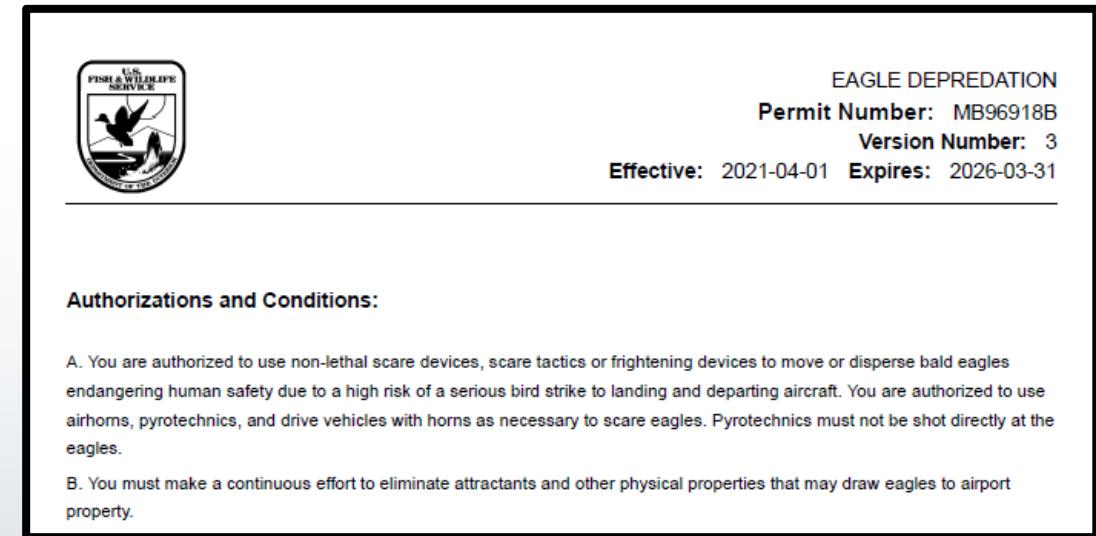
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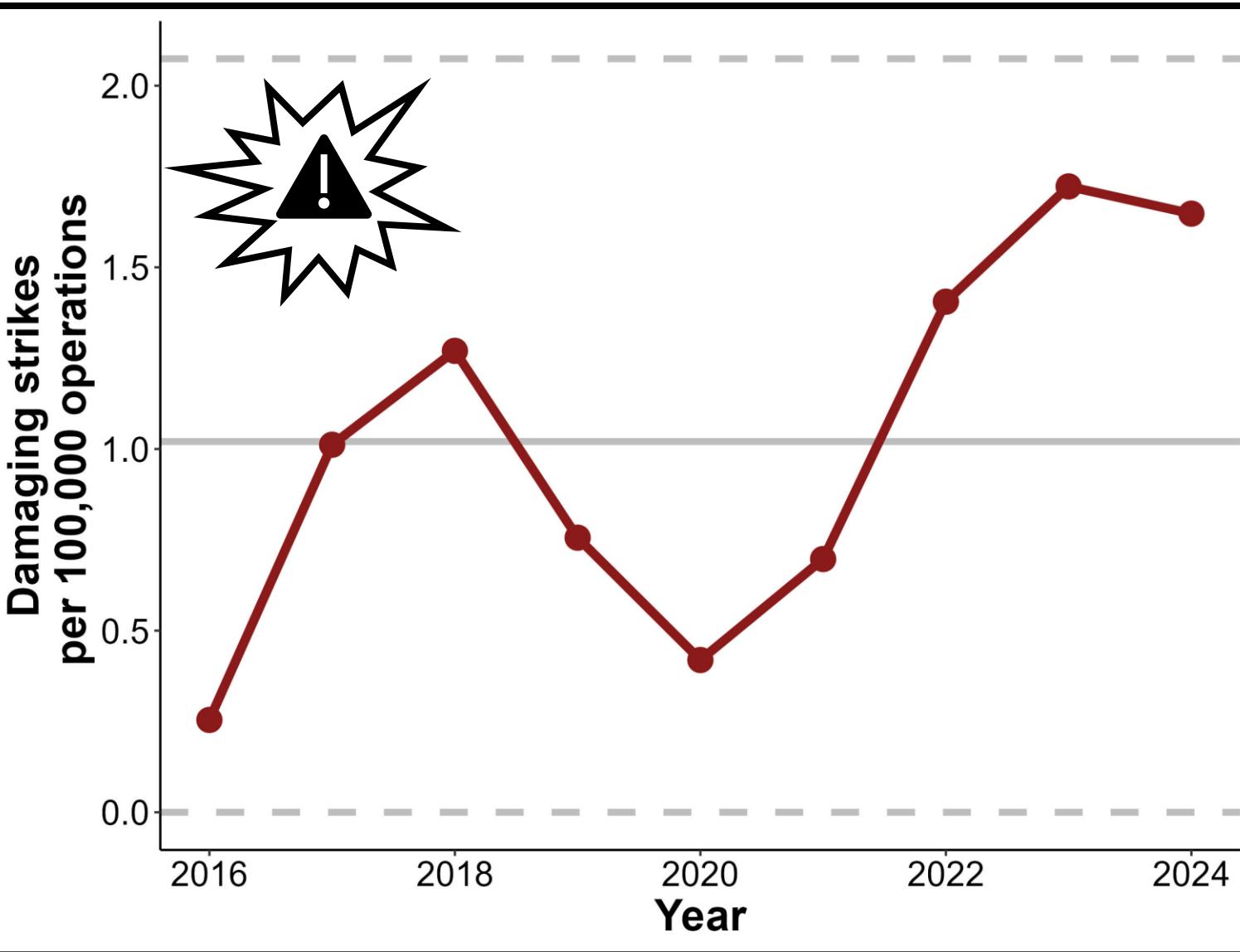
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- Invasive species have a negative impact on the environment; inside & outside of DTW

Permit compliance

- DTW's Federal Eagle Depredation Permit authorizes eagle harassment
- Must make a continuous effort to eliminate attractants that draw eagles to airport



Fish Attract Very Hazardous Birds



**Damaging-strike
rate higher than
average over past 3
years**

- Not statistically higher
- Fish-eating birds are a
strong driver

Fish-eating birds in the top-5 most hazardous species at DTW

We used an established methodology that been used to assess civil and military aircraft operations by the FAA, USDA, and the USGS (Dolbeer et al. 2000; Zakreajsek and Bissonette 2006; Dolbeer and Wright 2009; DeVault et al. 2011, 2018; Schwarz et al. 2014; Altringer et al. 2024)

Species	Total strikes reported	% With damage	% With substantial damage	% With EOF	Damage rank	Substantial damage rank	EOF rank	Composite rank	Relative hazard score
Snowy owl	22	18	9	14	3	2	2	1	41
Turkey vulture	2	50	50	0	1	1	7	2	100
Double-crested cormorant	2	50	0	0	1	4	7	3	50
Gulls (Larus sp.)	61	7	2	8	7	3	3	4	17
Canada goose	6	17	0	0	4	4	7	5	17

Fish-eating birds: Double-crested cormorant

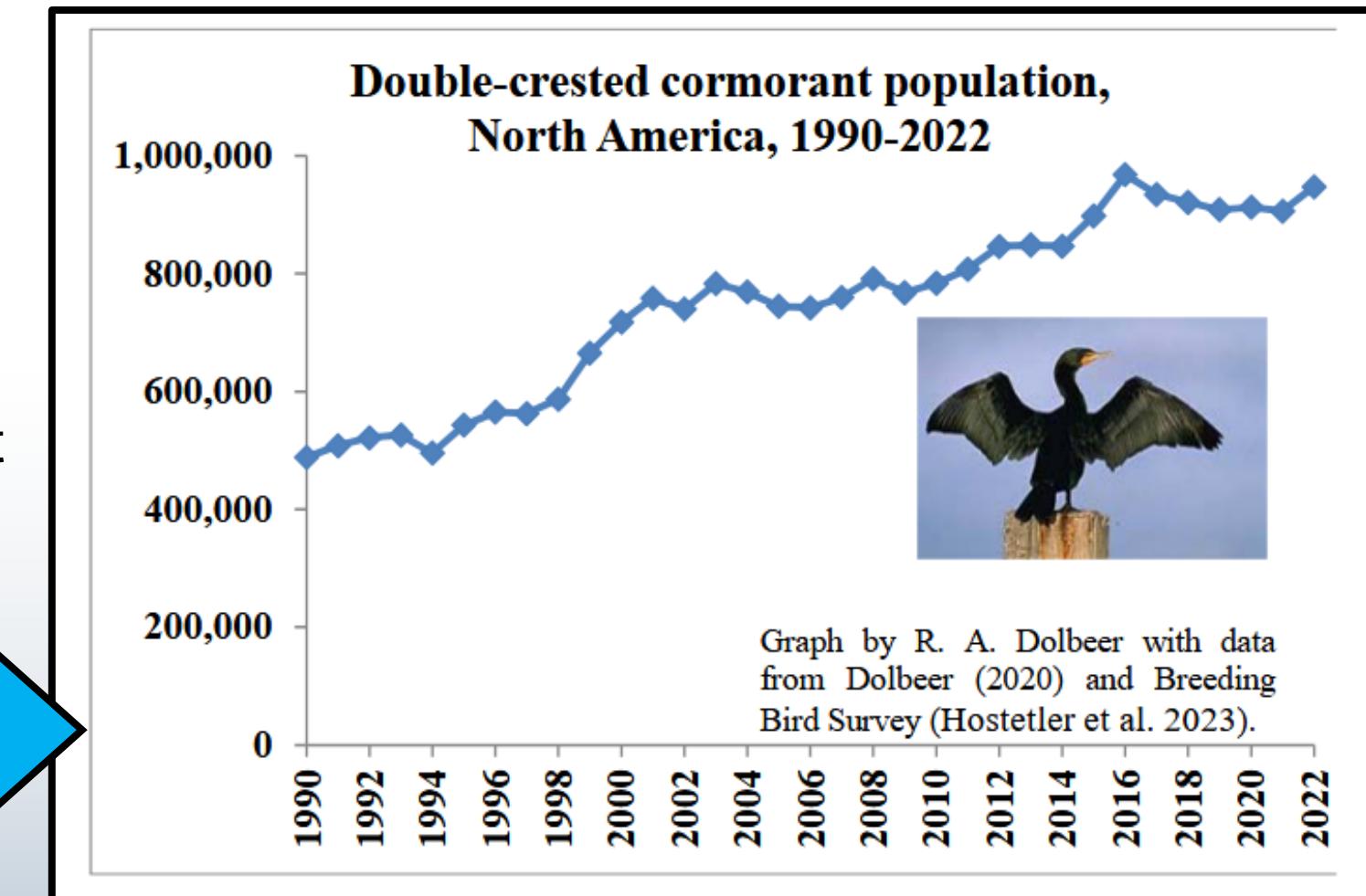
- 2 cormorant strikes in 2024
 - 1 damaged aircraft
- We've never had a cormorant strike before!
- *New norm?*



*Flock of cormorants at DTW pond, near runway.
PC: N. Scobal.*

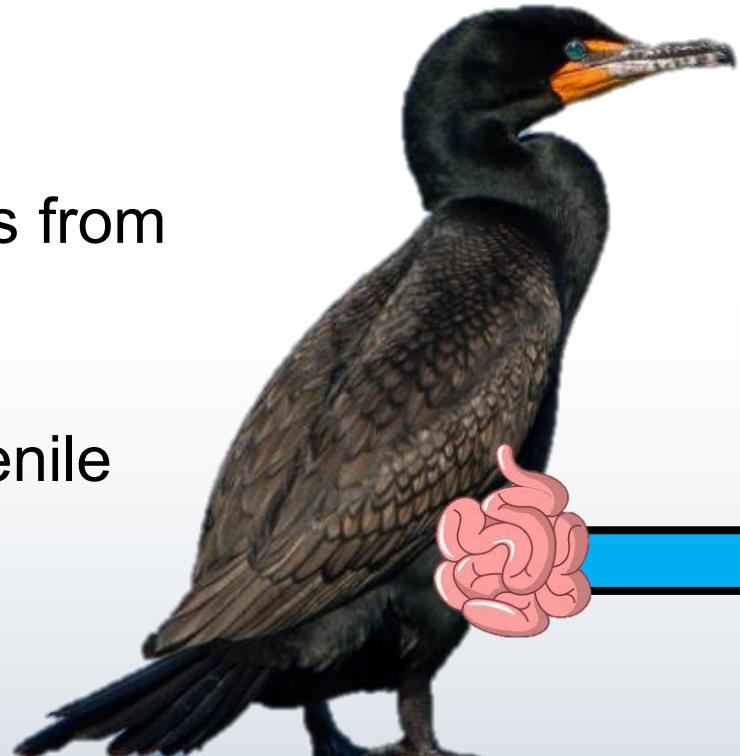
Fish-eating birds: Double-crested cormorant

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 - 1 damaged aircraft
- We've never had a cormorant strike before!
- *New norm?*
- N. American population growing
 - DTW implications



Fish-eating birds: Double-crested cormorant

- Dissected individuals from DTW
- Post-feeding event
- Stomachs full of juvenile goldfish



DTW cormorants had stomachs full of goldfish.

Fish-eating birds: Double-crested cormorant

Progress

- Perch sites = critical habitat component
 - Digestion
 - Drying
- Limited effectiveness with harassment efforts
- Removed most perch sites from ponds in 2024



Cormorants perching on DTW pond structures.

Fish-eating birds: Gulls

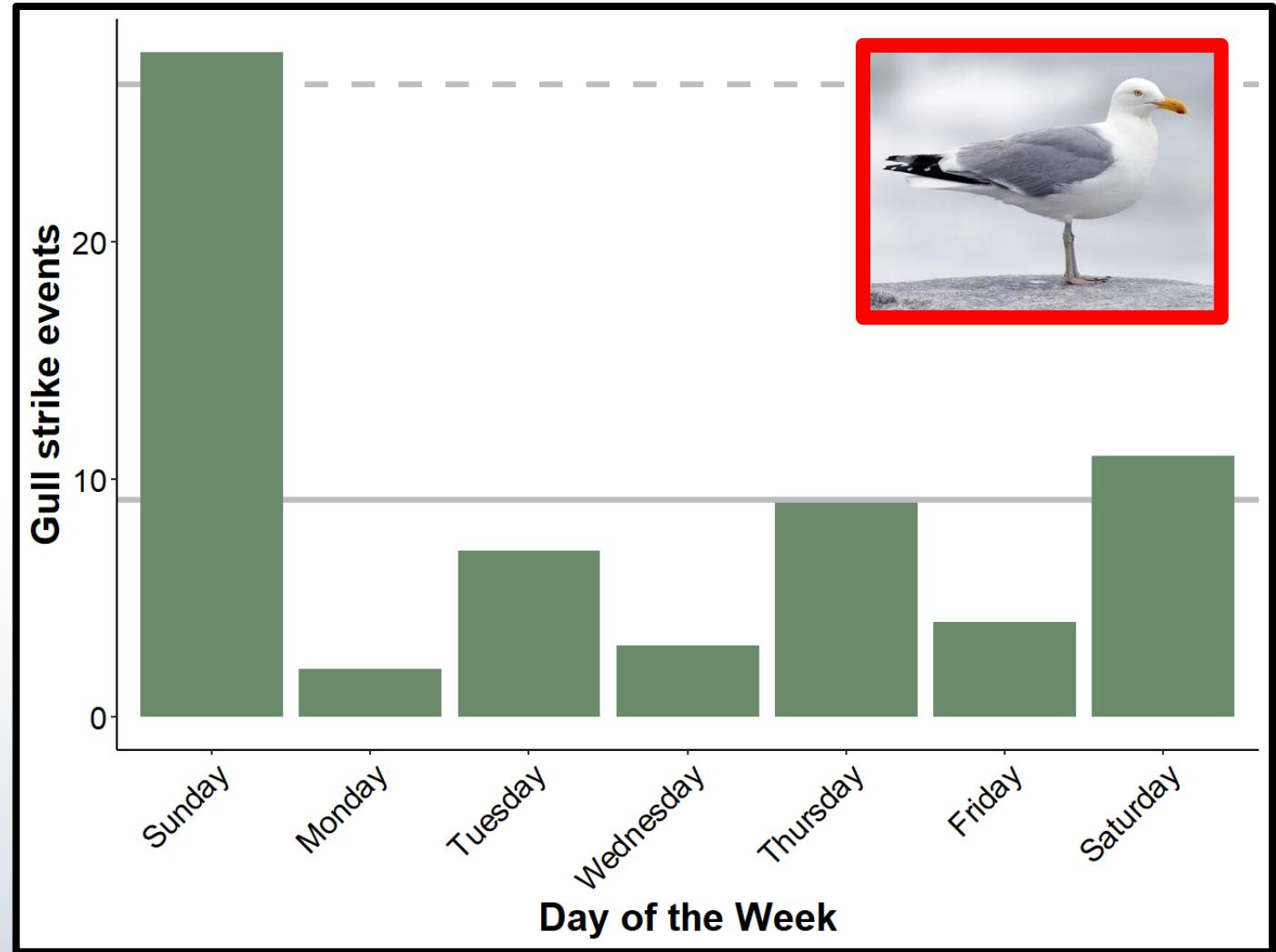
- 4 damaging strikes
- Nearby landfill
 - Expansion boosting local populations



Gulls feeding on goldfish winterkill at DTW pond.

Fish-eating birds: Gulls

- 4 damaging strikes
- Landfill
 - Expansion boosting local populations
 - Correlated with strikes (landfill closed on Sun)
 - >300% higher on Sundays



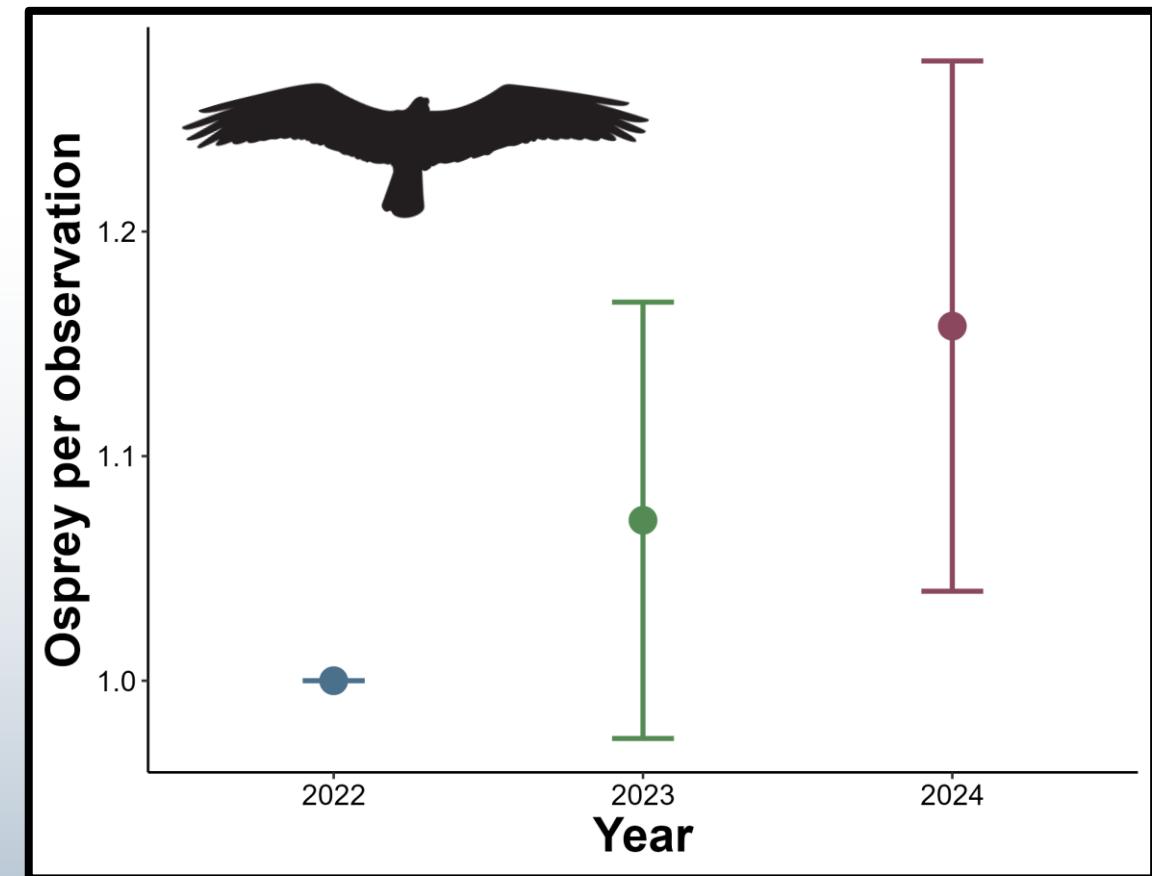
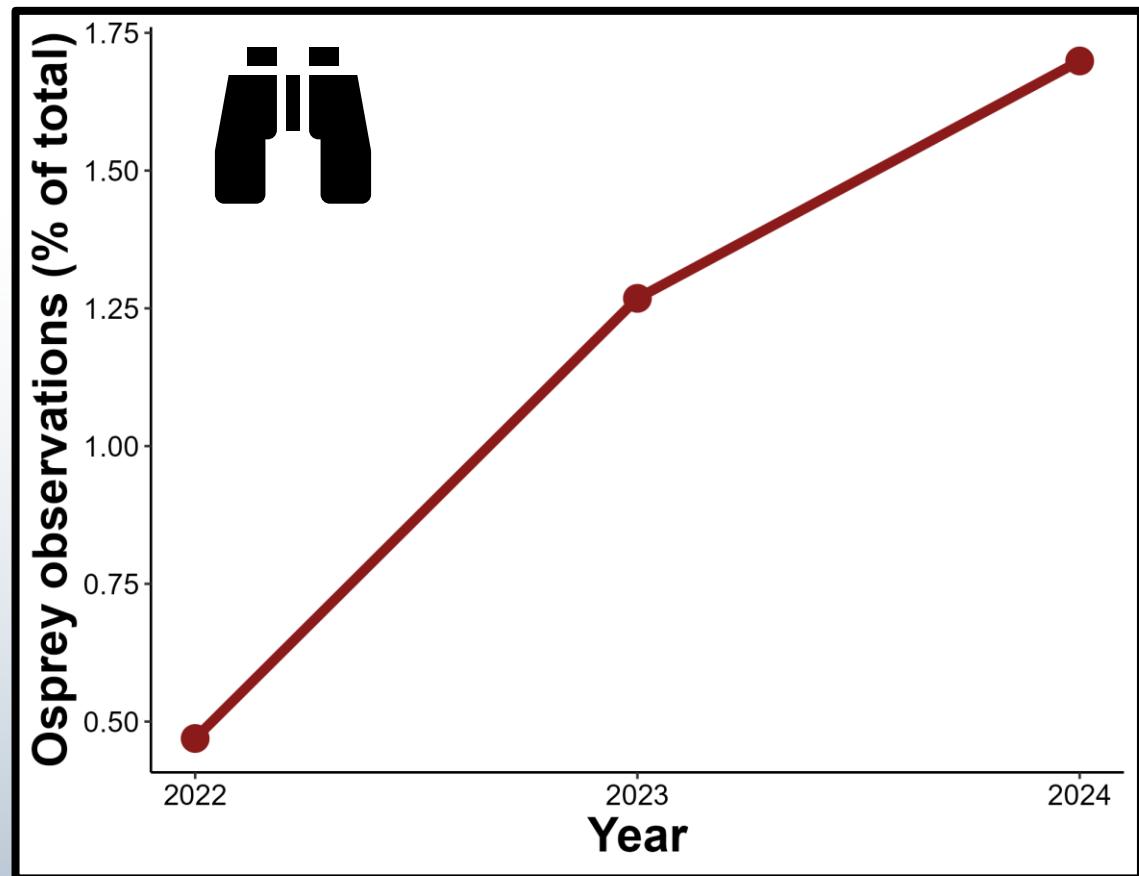
Fish-eating birds: Osprey

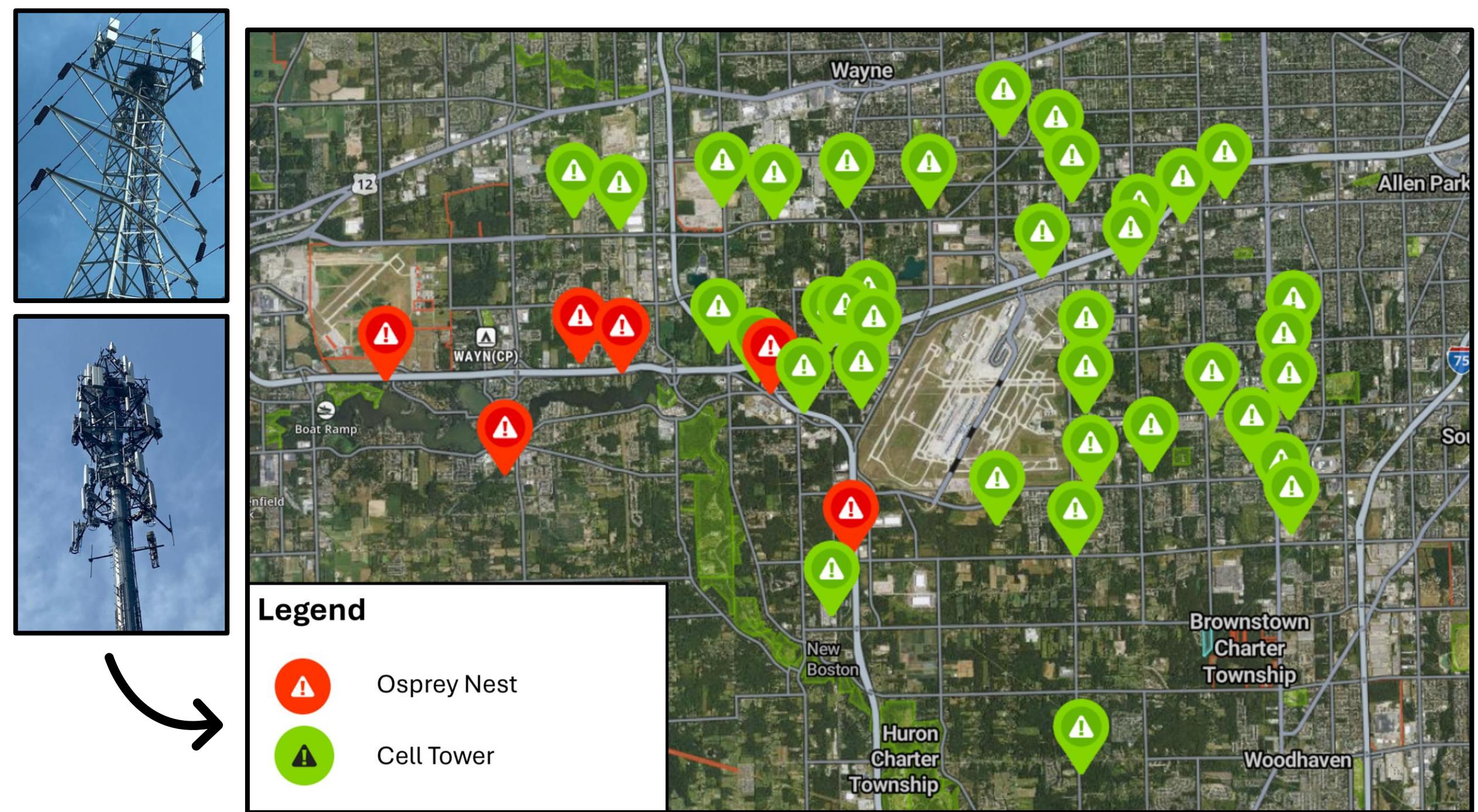
- Osprey are the most hazardous hawk at airports (FAA 2024)
- Commonly nest on towers
- Long-lived, return to nest sites
- Reintroduced to southern MI in early 2000s
- Surpassed recovery goals, reflected at DTW
- High profile, public interest
 - Potential for bad PR!

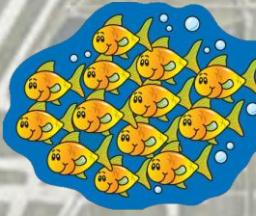


Osprey eating goldfish at DTW.

We're observing osprey more frequently and observing higher numbers



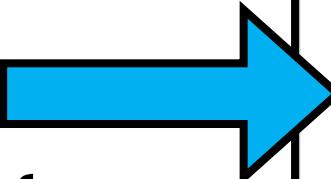




Osprey nest exclusion not received well by tower managers

Progress?

- Worked with nest-exclusion contractor
 - Free proposal
- Meetings with tower manager
 - Not cooperating because *they considered it a fish problem*



Osprey Nest Excluder Proposal for the Wayne County Airport Authority Osprey Public Safety Initiative

Presented by: Kathy Mason Maechtle, CTOM Principal
9 December 2024



Initial Discussion Date:
31 October 2024

Primary Contact Information:
Steven Gurney / Wayne County Airport Authority
(248) 277-8416
Steven.Gurney@wcaa.us

Scope of Work:
The Wayne County Airport Authority (WCAA) and the Detroit Metropolitan Airport (DTW) wildlife team report a significant increase in the presence of Osprey nesting activity as surveyed during the 2024 breeding season. It is well known that nesting Osprey activity occurring nearby airports pose a notable risk to aviation safety. Although no Osprey nests are currently located within the airport boundaries, the increase in Osprey nesting activity on human-engineered structures nearby is cause for concern. Known as generational habitation, Ospreys raised on artificial structures will likely choose similar sites to raise their young in the future, thereby expanding Osprey nesting on those types of structures.

The Federal Aviation Administration (FAA) recommends monitoring and managing hazardous wildlife attractions like human-engineered structures supporting telecommunications equipment. These structures appeal to Ospreys for perching, which often leads to nesting. To support a safe airport environment, the WCAA and the DTW wildlife team propose to proactively remove three (3) Osprey nests supported on telecommunications equipment within a 5-mile radius of the airport. In addition, to preemptively prevent re-nesting, CTOM recommends installing the Osprey Nest Excluder (ONE) devices at all three sites.

ONE History: The Osprey Nest Excluder was designed and patented by SEA-TAC airport raptor biologist Bud Anderson. In 2012, after several aircraft bird-strike events occurred with nesting Ospreys at two cell towers adjacent the airport runways, ONEs were installed. The results were immediate and long lasting. Aircraft Osprey-strikes at SEA-TAC has been eliminated.

Since then, more than twenty ONEs have been installed at various cell tower sites in the Washington area, as well as two in Florida. Data collected by CTOM over the last decade support the devices consistently exclude Osprey re-nesting. However, while the devices performed as intended, two were subsequently removed by the tower owner after the tenacious Ospreys relocated to nest on unprotected equipment mounted lower on the towers. Therefore, CTOM recommends all tower levels supporting cellular equipment are also excluded using the ONE to deter additional re-nesting attempts elsewhere.

The simple, yet elegant ONE design dissuades nesting by frustrating the Ospreys' attempts to deposit sticks and other materials which are deflected and resist accumulation. Using high quality marine-grade stainless steel components, the non-wind loading ONEs have held up to multiple hurricane events in Florida where sustained wind speeds have exceeded 70mph with gusts over 130mph. Lastly, passive intermodulation (PIM), a type of signal interference that can degrade the performance of wireless networks has not been proven a concern at sites where ONEs have been installed.

1

Fish-eating birds: Bald Eagles

- Federal Eagle Depredation Permit authorizes harassment at DTW
 - "...must make a continuous effort to eliminate attractants...that may draw eagles to airport..."
- *Fish removal would better facilitate compliance*



Bald eagle eating fish and being harassed at DTW.

Decisions Framework

In progress!

Problem Statement

- Abundant goldfish at DTW attract highly hazardous birds to the airport

Long-term Solution

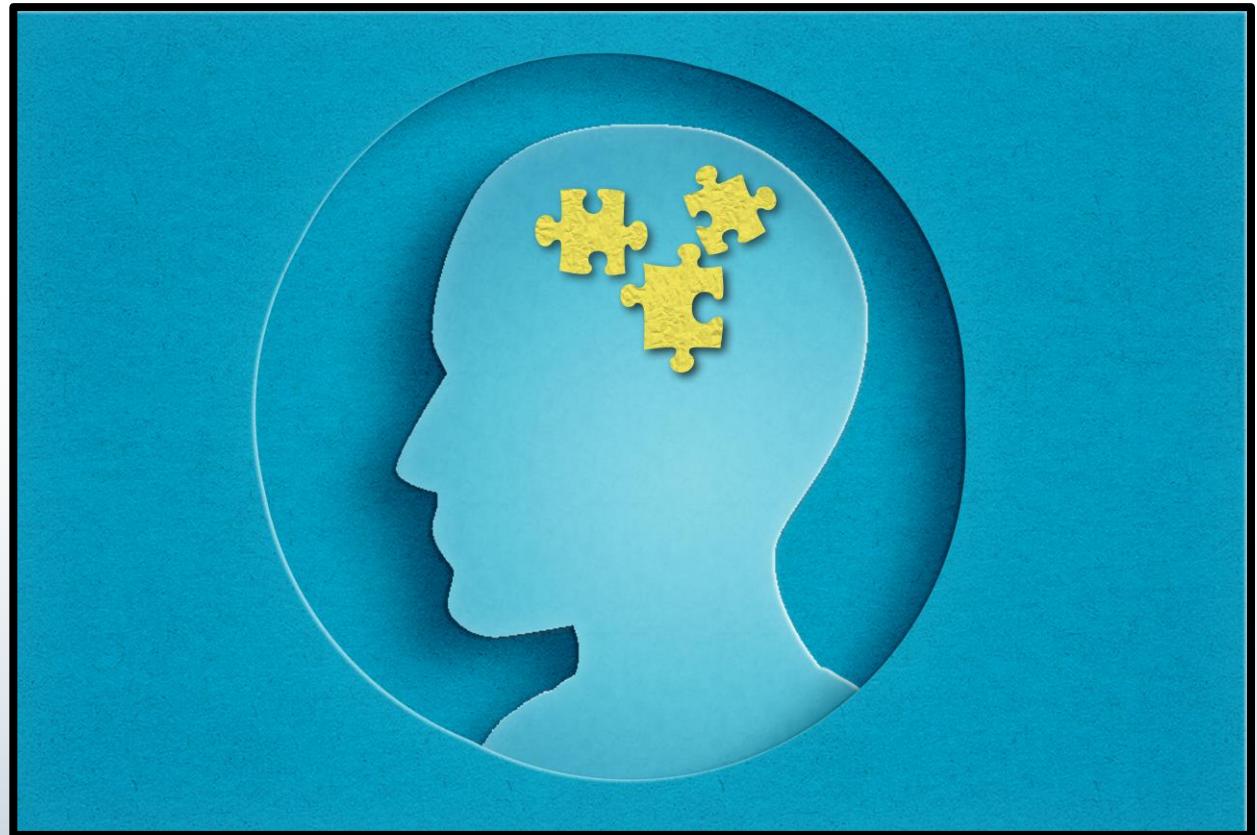
- Move ponds underground
- Moving ponds offsite should not be an option
- Never create a hazard and then mitigate it.
 - 5-mile hazard buffer (AC 150/5200-33C)
- MI & MN DNR best management practice = basin manipulation

5-Year Goal

- Reduce fish abundance in ponds to reduce attractiveness to piscivorous birds

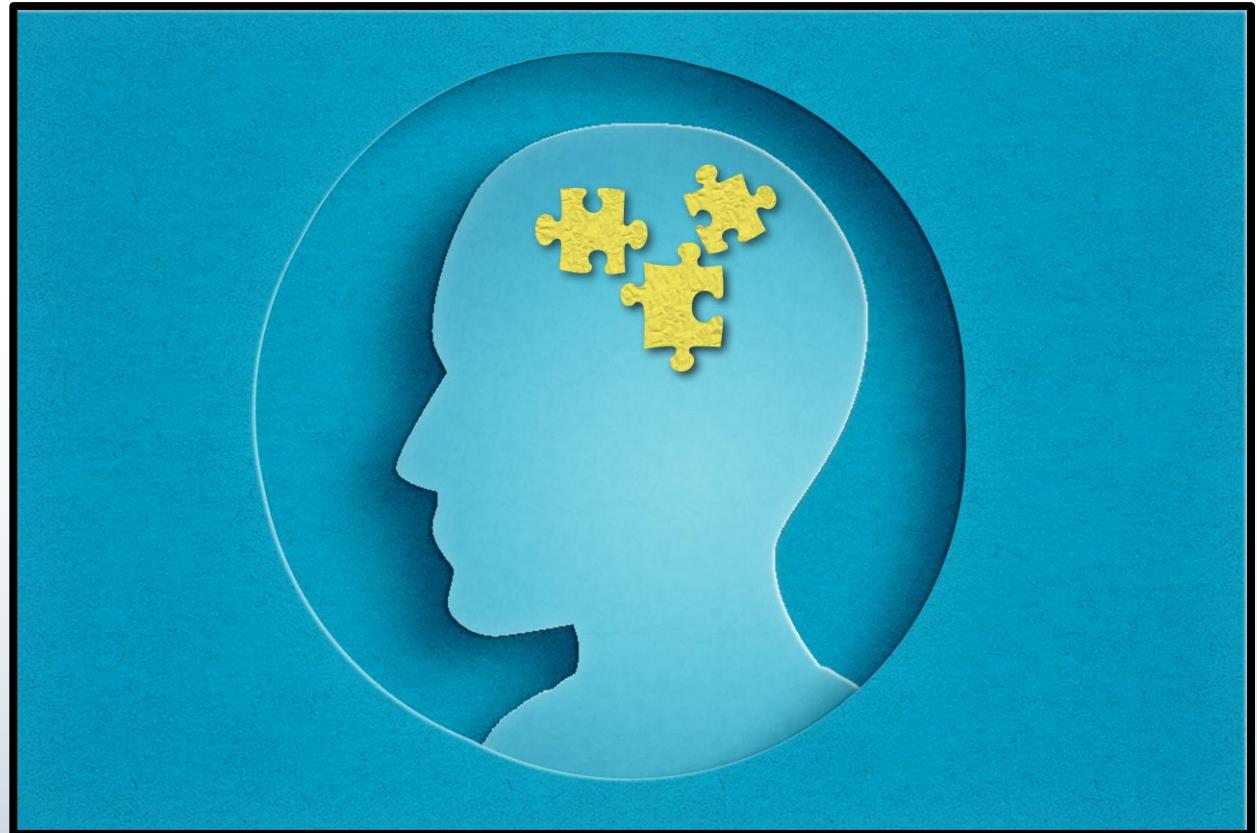
Decision criteria

1. Cost
 - Treatment
 - Clean up
2. Effectiveness
 - Time to affect fish abundance
 - Amount of fish population removed
3. Implementation difficulty
 - Permitting
 - Compliance risks
 - Palatability



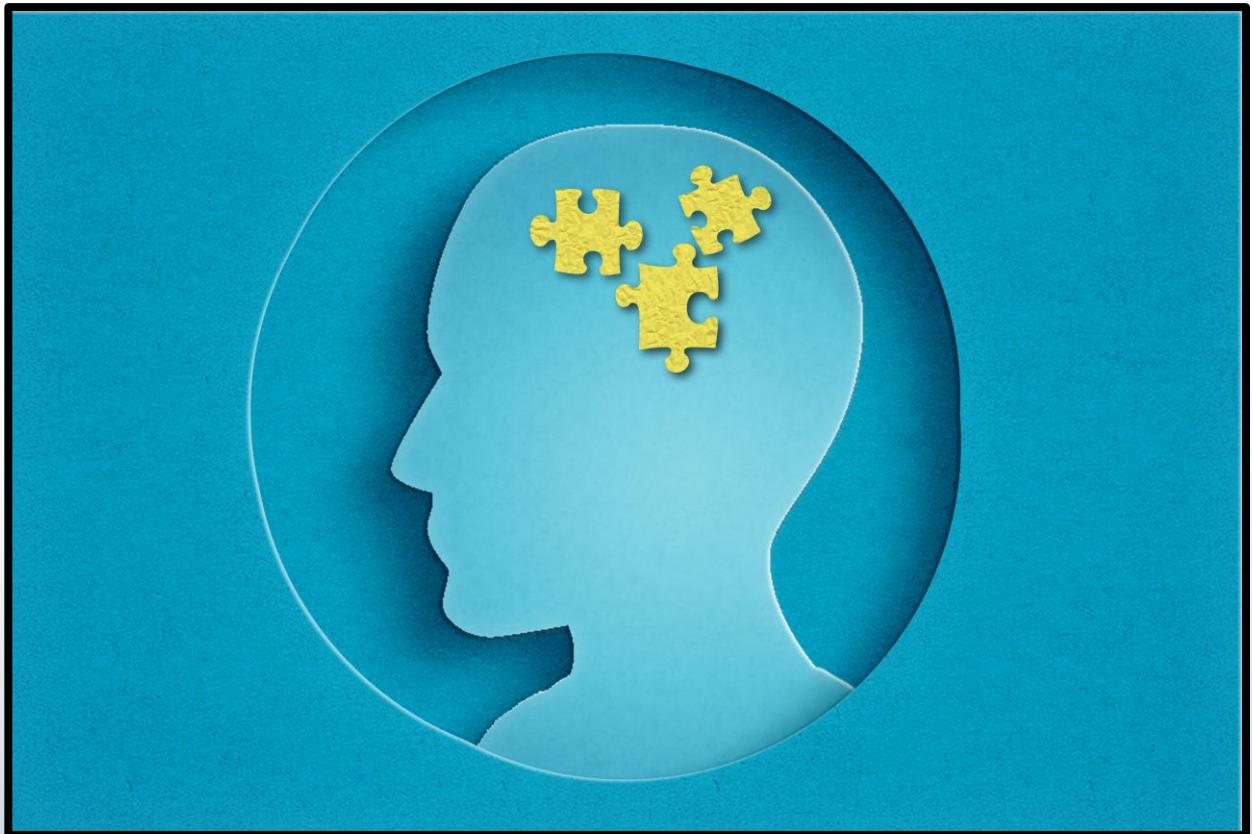
Management alternatives

- Status quo (do nothing)
- Chemical treatment (Rotenone)
- Mechanical harvest (netting)
- Mechanical harvest (electroshocking)
- Basin manipulation (regrading for full drainage)
- Predator stocking (e.g., northern pike)
- Carbon dioxide pumping
- Hybrid option(s)?



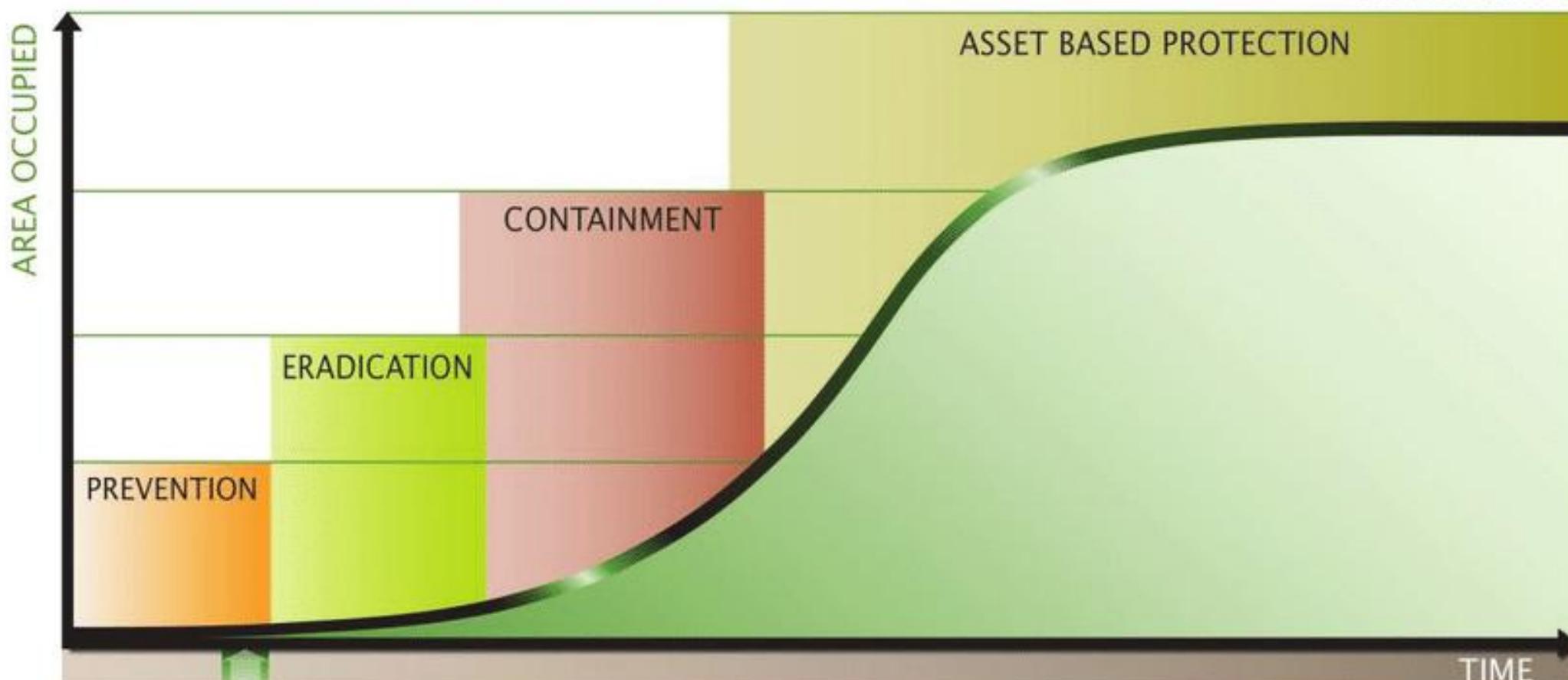
Potential constraints

- Coordination
 - Environmental permits
 - Runway closures
- Timing & ability to manipulate water levels
 - De-ice
 - Weather dependent
 - Flood concerns (discharge)
- Limited opportunity for water-level manipulation
 - June – October
- Boat accessibility
 - Launching
 - Shallow areas
- Additional permitting
 - Federal, state
 - Amendments



GENERALISED INVASION CURVE SHOWING ACTIONS APPROPRIATE TO EACH STAGE

Version 2.0; 24 JUL 2013



Species absent	Entry of invasive species	Small number of localised populations	Rapid increase in distribution and abundance, many populations	Invasive species widespread and abundant throughout its potential range
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ECONOMIC RETURNS (INDICATIVE ONLY)

1:100
Prevention

1:25
Eradication

1:5-10
Containment

<1:1-5
Asset Based Protection

Structured-decision making

Literature review:

- Agency websites
- Reports
- Research

Consulting with:

- MDNR
- USFWS
- EGLE

Proposals & estimates

- Contractors
- Other businesses

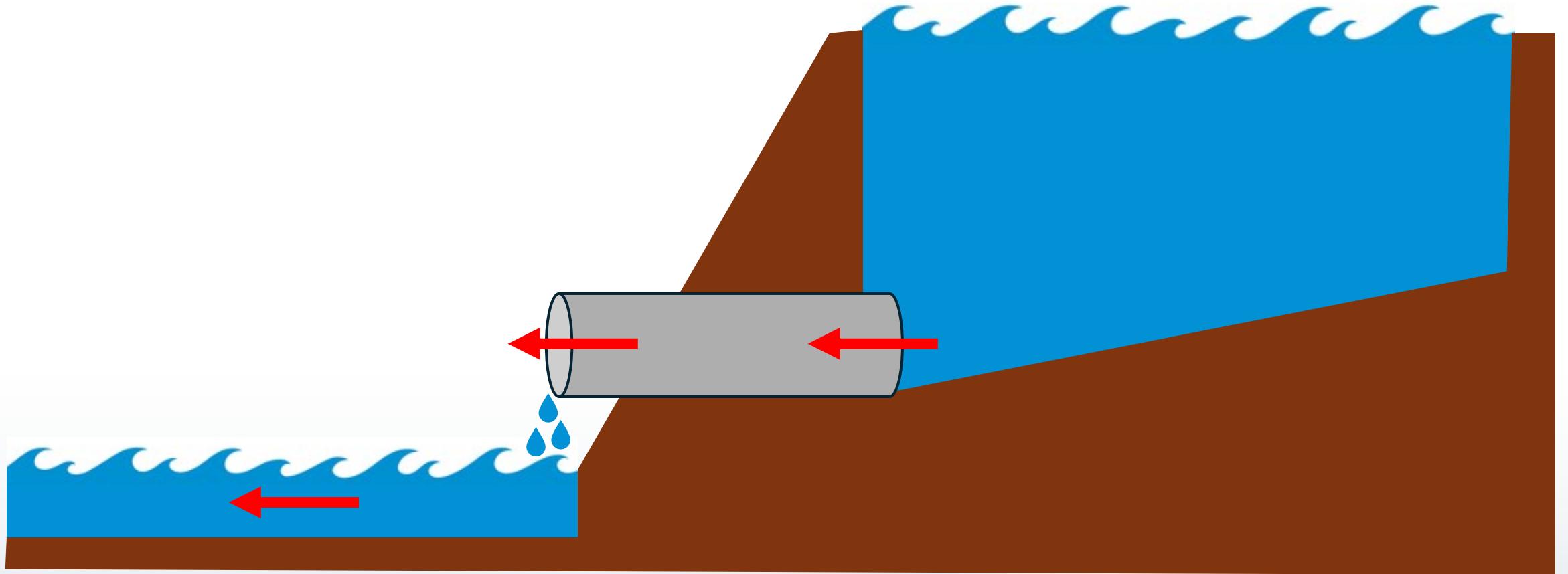
Management alternative	Up-front Cost	*Long-term Cost	Effectiveness	Frequency needed	Difficulty
Status quo					
Chemical treatment (Rotenone)	\$55,052			1 per 10 years?	HIGH
Mechanical harvest (netting)					
Mechanical harvest (electroshocking)					
Basin manipulation					
Predator stocking (e.g., northern pike)			Slow, lagged effects	Low	
Carbon dioxide pumping					

Take-Home Messages

1. DTW's ponds are full of invasive goldfish, and it has been unmanaged for 10 years.
2. Fish management better aligns with WCAA goals, and will benefit safety, liability, sustainability, and permit compliance.
3. Fish-eating birds are a strong driver of damaged aircraft, and DTW's damaging strike rate has been higher than average for 3 years.
4. The Wildlife Team has made continuous efforts to address the problem.
5. The Wildlife Team has limited tools in their toolbox, and fish management is an unutilized and much needed tool at DTW.

Unknowns, Uncertainty, Concerns

- Biomass → Size of clean up
- Proper disposal → Where accepted? On-site burial?
- Commercial harvest zones? And who's available?
- Is it risky add Rotenone to water that eventually gets discharged into public waters?
 - Past court case with water discharge killing fish (oxygen)
- Will we have a leftover mess afterwards? Attractant? WCAA labor?
- Fish in the drainage pipes
- Open system challenges: 1) inward fish movement, 2) fish in drainpipes.
- Timing of treatment? Seasonal implications?
- Coupling treatment with construction or maintenance
- Can we fix drainage so it can be fully drained? (MN-DNR BMP)
- Is there only goldfish at DTW?
- Snail management?

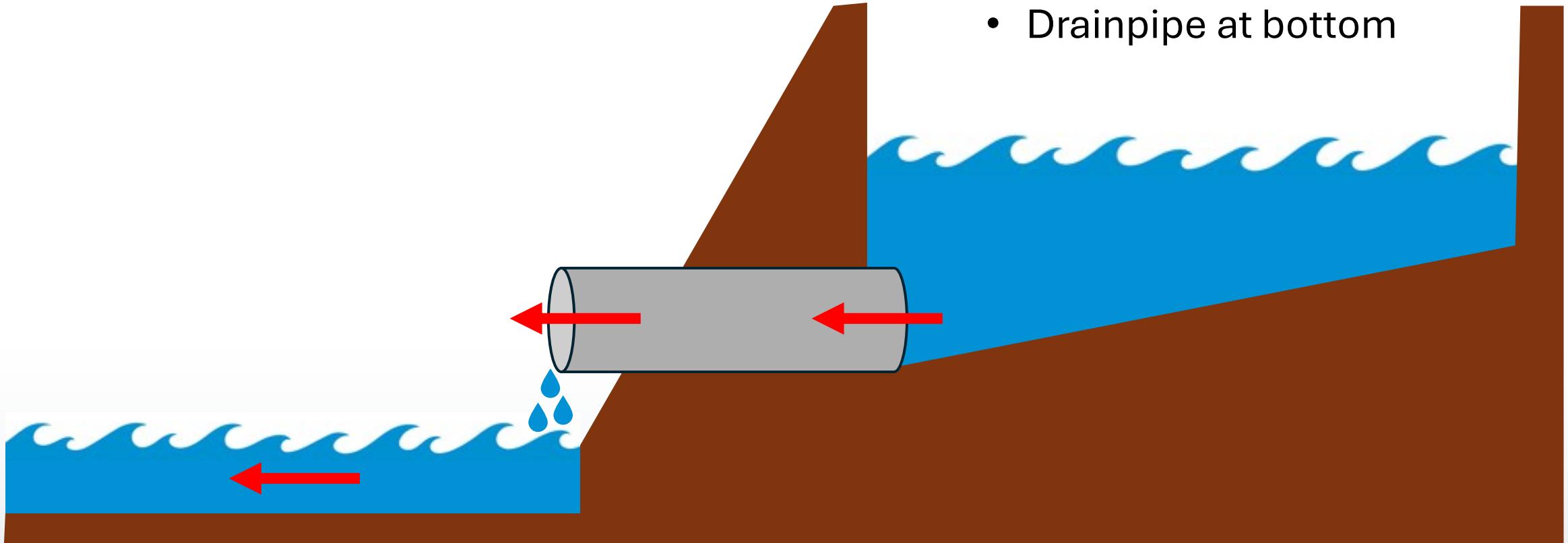


Drain

Detention Pond

Intended Function

- Drainpipe at bottom

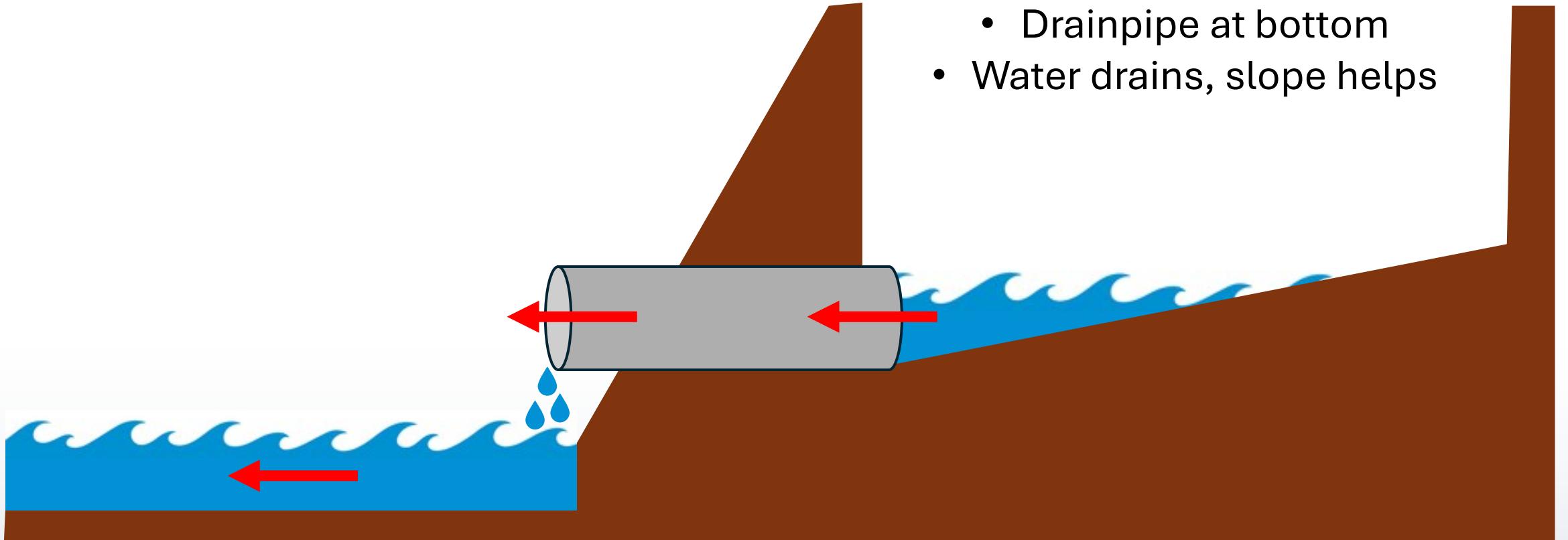


Drain

Detention Pond

Intended Function

- Drainpipe at bottom
- Water drains, slope helps

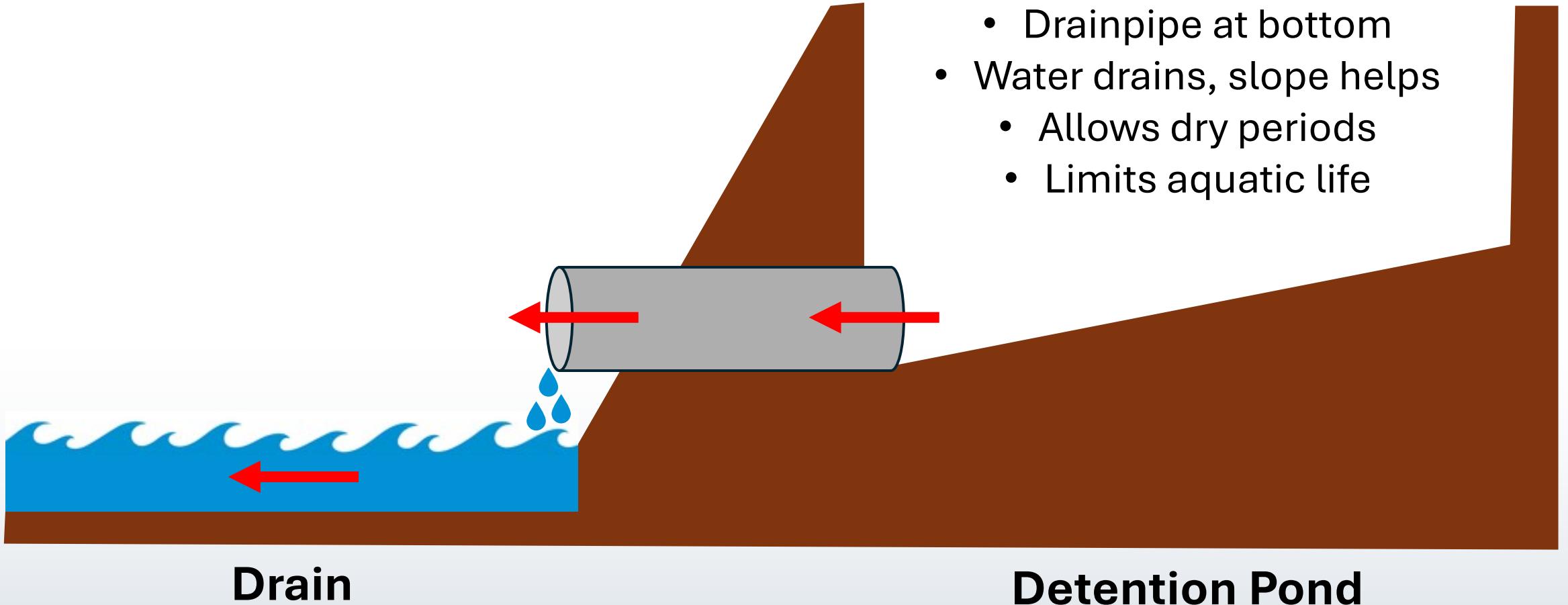


Drain

Detention Pond

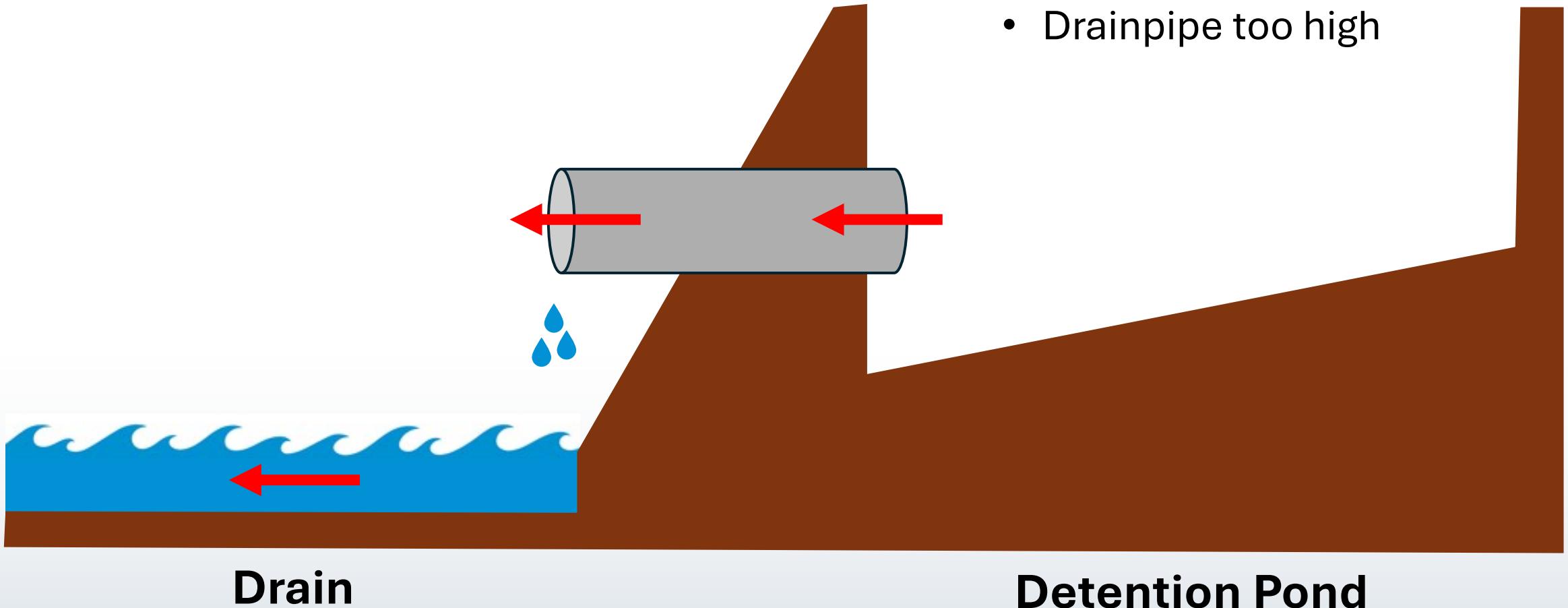
Intended Function

- Drainpipe at bottom
- Water drains, slope helps
 - Allows dry periods
 - Limits aquatic life



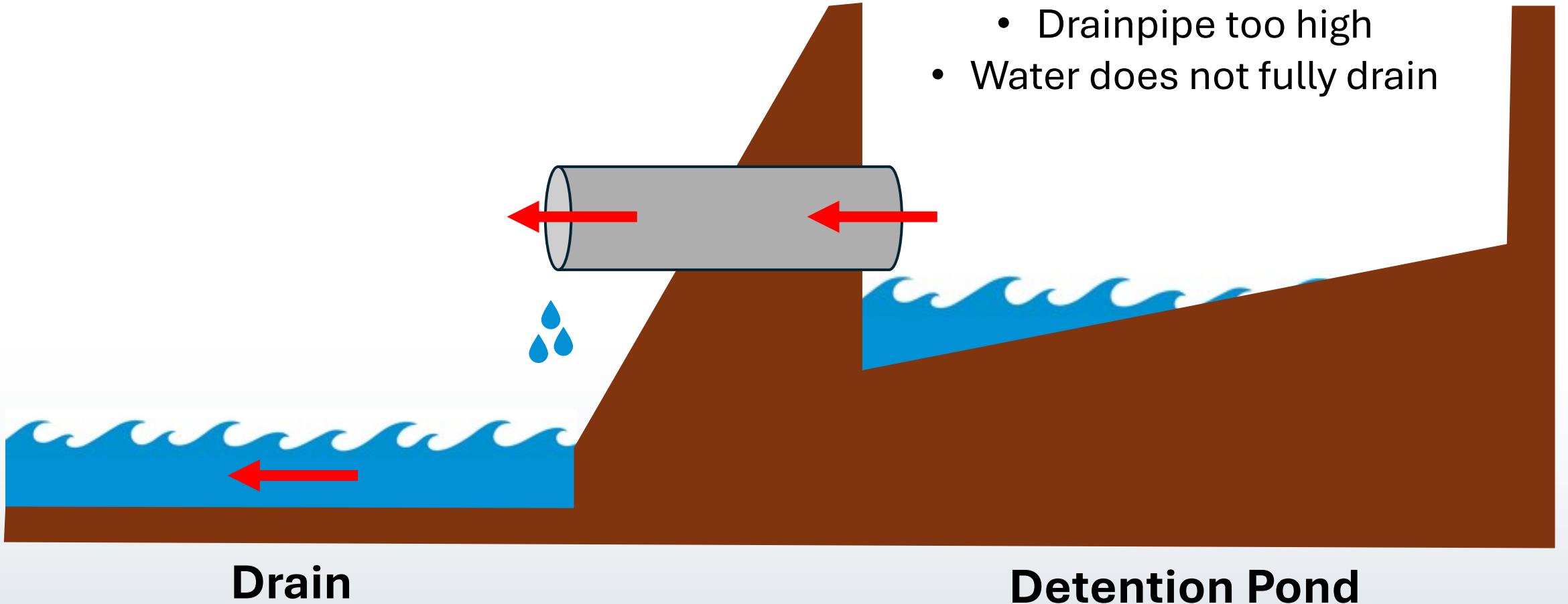
Current Function

- Drainpipe too high



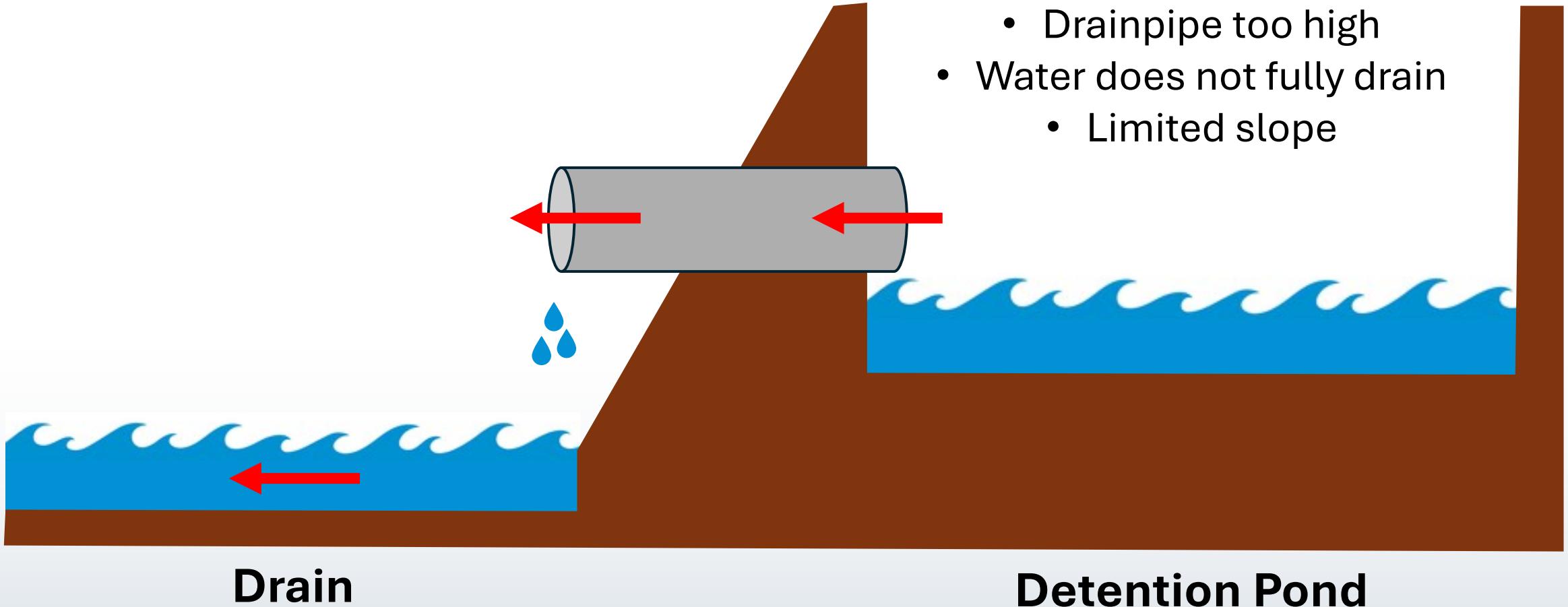
Current Function

- Drainpipe too high
- Water does not fully drain



Current Function

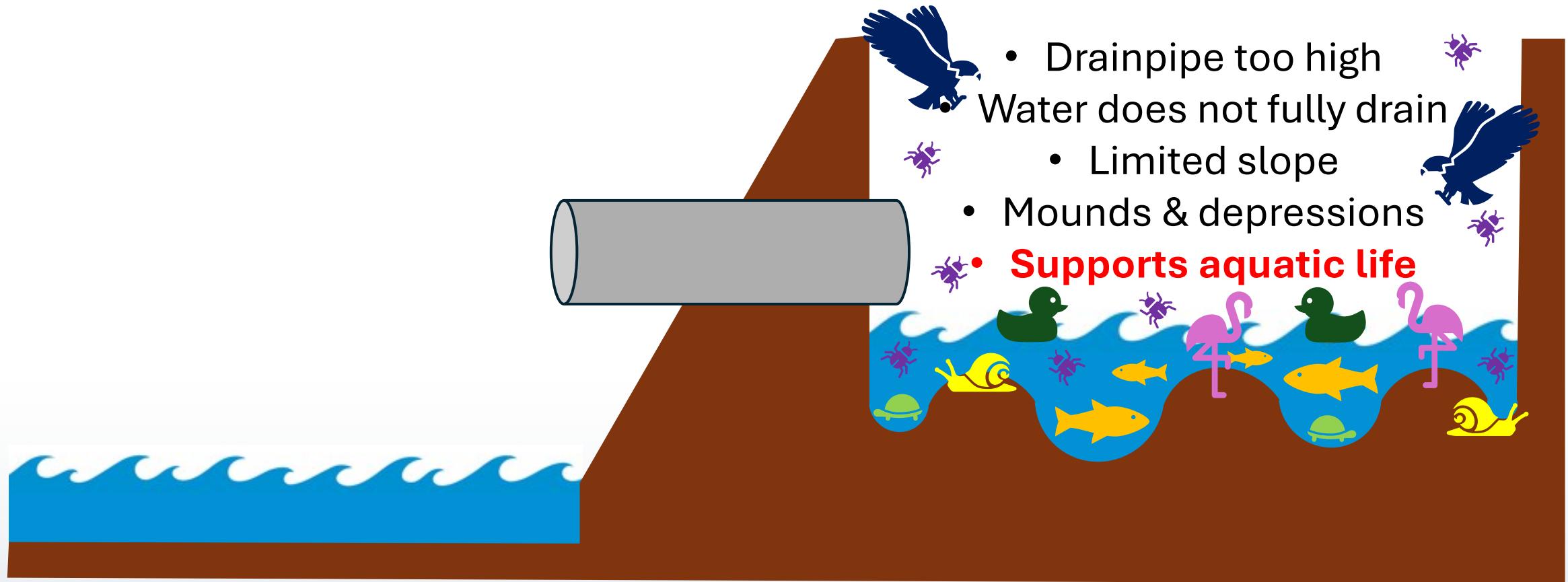
- Drainpipe too high
- Water does not fully drain
 - Limited slope



Current Function



MB
11QOD



Drain

Detention Pond

Current Function

Pond Management History

- Current 3.5ft depth to deter wading birds, etc.
- <3.5 ft resulted in high bird activity
- Cannot fully drain ponds as is
 - Drainpipe too high relative to water levels
 - Uneven substrate (pockets, mounds, poorly sloped)
- Nearly drained ponds → Massive fish and bird die offs, suspected botulism outbreak
 - Toxin accumulates in the soil and decaying plant matter
 - Thrives in environments with low oxygen, warm temps
 - Shallow, stagnant waters

Video Examples

- <https://www.youtube.com/watch?v=dMyK0QDoREU&pp=ygUMY2FycCByZW1vdmFs>
 - Kentucky, large-scale carp removal from a lake.
- <https://www.youtube.com/watch?v=dF32P4jMFiU&pp=ygUMY2FycCByZW1vdmFs>
 - Illinois, large-scale carp removal from a lake.
- <https://www.youtube.com/watch?v=uga8ZUa15jE&t=211s>
 - Utah, large-scale carp removal under the ice.
- <https://www.youtube.com/watch?v=37Uw2IkEx8A>
 - Minnesota, removing goldfish from river during seasonal movement.

Good literature

- <https://doi.org/10.1016/j.jglr.2023.102253>
 - Seasonal grouping behavior has implications for removal, with larger aggregations in deeper water in cold months; and less aggregation during warmer temps in shallow water near cover.
- <https://www.researchgate.net/publication/327873611>
 - Lit review that shows poor data & evaluations lead to inability to conclude BMP for removals.
- <https://fwp.mt.gov/binaries/content/assets/fwp/news/public-notices/2023/region-6/goldfish-removal-from-private-pond-near-big-sandy.pdf>
 - Example of a Montana-agency Rotenone plan for goldfish, suggesting rigorous permitting process. In-depth details about Rotenone.
- <https://doi.org/10.3390/fishes6010006>
 - Tasmania, multi-facet approach for removing different age classes of carp.

Good literature

- <https://www.hennepin.us/-/media/hennepinus/business/work-with-hennepin-county/docs-a-l/ais-goldfish-study-2021.pdf>
 - Report from contractor including goldfish & carp survey techniques.
- <https://doi.org/10.25225/jvb.21057>
 - Review of carp management, very good descriptions of population management techniques, like using speakers, modified electrofishing equipment, and cell-by-cell corralling.
- <http://digitalcommons.unl.edu/ncfwrustaff>
 - Pit-tagged fish helps inform targeted removal of aggregated carp.