Iowa Heartland Resource Conservation & Development

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"Building partnerships for healthy land, water, and communities"

WIRB Final Report – Saylor Creek

Environmental Accountability

Water quality sampling was done in advance of the project, during construction and following the project. The results are attached, with one sheet showing the data sorted by location (upstream to downstream), and the other sheet showing the same data sorted by date. The data was not sufficient to draw any conclusions as to the effectiveness of the improvements.

Various Best Management Practices were installed as a part of this project, many in progression, forming a "treatment train" in this watershed. Following is a recap of the practices that provide water quality benefits through removal of pollutants. The expected pollutant removal efficiencies are taken from the Iowa Stormwater Management Manual.

BMP Type	Typical Pollutant Removal (percent)				
	Suspended Solids	Nitrogen	Phosphorous	Pathogens	Metals
Constructed Wetlands	50-80	<30	15-45	<30	50-80
Wet Detention Basins	50-80	30-65	30-65	<30	50-80
Wet Swale	74	40	28		<30
Vegetated Filter Strips	70	30	10		40-50

In addition to the water quality benefits identified above, the wetland, bioswale, bioretention cell and the wet detention basins (lakes) also provide treatment of the water quality runoff volume (WQv), channel protection volume (CPv), overbank flood protection, and extreme flood protection capabilities as quantified below.

North Lake

Pool storage = 1,923,000 CF (44.1 acre-feet) – 6,650 CF counted for WQv from residential area (0.3% of pool volume displaced)
Extended Detention of CPv (1-year) = 398,000 CF (pool depth 1.7 feet)
Overbank Flood Protection (5-year) = 630,000 CF (pool depth 2.5 feet)
Extreme Flood Protection (100-year) = 1,065,000 CF (pool depth 3.9 feet)

South Lake

Pool storage = 1,990,000 CF (45.7 acre-feet) – none counted for WQv
Extended Detention of CPv (1-year) = 386,000 CF (pool depth 1.6 feet)
Overbank Flood Protection (5-year) = 638,000 CF (pool depth 2.6 feet)
Extreme Flood Protection (100-year) = 1,090,000 CF (pool depth 4.0 feet)

Bioswale
Provides 11,480 CF of WQv treatment (based on retention time of >10 mins with velocity of less than 1.0 fps for design event)

Bioretention Cell
Provides 8,200 CF of WQv treatment (based on storage provided)

Wetland NL2 (Off of west leg of North Lake)
Provides 58,025 CF of WQv treatment (based on above pool extended detention, available pool storage not credited)
Extended Detention of CPv (1-year) = 65,000 CF (pool depth 1.9 feet)
Overbank Flood Protection (5-year) = 83,400 CF (pool depth 2.7 feet)
Extreme Flood Protection (100-year) = 189,000 CF (pool depth 5.2 feet)

Other improvements that were installed as a part of the project do not have specific pollutant removal capabilities, but provide preventative benefits by protecting against sediment delivery through erosion prevention and restoration and stabilization of a degraded stream channel. These include:

1. Level Spreaders that distribute storm water over a large surface area rather than in a concentrated pipe outlet.
2. Drop Structures that reduce stream velocity and scouring effects by concentrating elevation drops in specific locations, and flattening the stream bed both upstream and downstream.
3. Riffle Dams that serve a similar purpose to a drop structure with a more natural effect. Instead of dropping over a sheer falls, the rock dams are sloped between 10:1 and 20:1 downstream to allow water to “riffle” over the rocks.
4. Bank Stabilization accomplished through a combination of grading and armoring the toe of the slope. Stable side slopes of 2.5:1 or flatter are provided and the toe of the slope is protected through concrete or rock against regular storm events. The slopes are re-vegetated using deep-rooted plant species.

<u>Program Accountability</u>

In addition to the specific project improvements, the land development and new public improvements that are occurring within the watershed adjacent to the project also included the construction of six infiltration basins that collect runoff from the new streets, 464 square yards of pervious pavement in new alleyways (photo attached), four constructed wetlands, one native landscaping bed, 2 raingardens, one bioswale, one detention basin which includes an infiltration trench, and a bioretention area. The aquatic center under construction has an infiltration median in the parking lot and two water treatment basins. The additional BMPs were installed by the City of Ankeny and by DRA Properties, Inc.

The constructed wetland associated with the subdivision developments provides:
81,500 CF of WQv treatment (based on 49,500 of pool storage and 32,000 CF of above pool extended detention)
Extended Detention of CPv (1-year) = 40,000 CF (pool depth 0.6 feet)
Overbank Flood Protection (5-year) = 102,000 CF (pool depth 1.5 feet)
Extreme Flood Protection (100-year) = 226,000 CF (pool depth 2.9 feet)

Site improvements that treat the “water quality” and “channel protection” volumes were included on sites developed by the Future Farmers of America chapter and the Iowa Soybean Association.

An educational sign (copy attached) explaining the components and benefits of the constructed wetland was installed as a part of the WIRB project. The sign is located along a multipurpose trail that leads from the sidewalk along the street to the fishing pier on the north lake. Readers of the sign are situated between the constructed wetland and the lake, and can learn how the wetland cleans the water before it enters the lake behind them (as they are facing the sign.)

Iowa Heartland RC&D and the City of Ankeny have hosted four separate walking tours of the watershed improvement project and other BMPs within the area. The City of Ankeny hosted a Conservation Design tour of four parks on September 30, 2008. Twelve citizens participated in the tour, which was led by Inger Lamb, a local conservation design expert. The tour included tips for the attendees on managing stormwater in their backyards. The tour was promoted in an article in the Des Moines Register. A similar tour was hosted by the City of Ankeny Parks and Recreation on September 29, 2009. Twelve citizens also attended that tour. The 2009 tour focused more on the water quality benefits of native landscaping.

The Iowa Heartland RC&D hosted an Urban Stewards meeting on October 8, 2008. A walking tour was held of the stormwater BMPs installed in the Prairie Trail development of Ankeny. A local consulting engineer, who was the City’s consultant that designed the water quality improvement project, gave the introduction to the project and led the tour. The group of 16 people viewed level spreaders, bioretention areas, grade stabilization structures, native plantings, and fish habitat structures. Attendees were staff from the USDA NRCS, IDNR, and Polk SWCD, soil commissioners, engineering and landscape architect consultants and other interested citizens.

The City hosted a tour of the project for the Watershed Improvement Review Board and IDALS staff on April 24, 2009.

In addition to the tours, the project received two awards for the design and construction of the weir outlet structures for the north and south lakes. One award was an Excellence in Concrete Award from the Iowa Ready Mixed Concrete Association. The other award was an Iowa Quality Initiative Structures Award presented by the Iowa Department of Transportation and the Associated General Contractors of Iowa.

On January 27, 2009, Megan Reuther of News Channel 13 in the central Iowa television market, did a feature story on the City of Ankeny for her Renew Iowa segment. WHO-13 estimates this story was watched by 45,000 viewers. The Saylor Creek WIRB project, and its emphasis on improving water quality through the treatment train approach, was discussed in the story.

Total Project Funding

Funding Source	Cash		Total		% of Total	
	Approved Application Budget ($)	Actual ($)	Approved Application Budget ($)	Actual ($)	Approved Application Budget	Actual
WIRB	$ 500,000	$ 500,000	$ 500,000	$ 500,000	13%	15%
City	$ 3,366,200	$ 2,564,619	$ 3,366,200	$ 2,564,619	87%	80%
Landowner	$ -	$ 170,000	$ -	$ 170,000	0%	5%

City Total Project Funding

Vendor	**Total**	
Nilles Associates, Inc.	$ 422,000.00	Design/Constr. Engineering
Jensen Construction Company	$2,125,692.75	Construction
Applied Ecological Services, Inc.	$ 256,383.64	Construction
DRA Properties, L.C.	$ 170,000.00	Construction
Tallgrass Historians, L.C.	$ 28,506.74	Archaeological Investigation
Snyder & Associates, Inc.	$ 1,790.50	Wetland Delineation
Brick Gentry Law Firm P.C.	$ 629.50	Legal Services
Polk County Recorder	$ 47.00	Document Recording Fees
Ahlers & Cooney, P.C.	$ 4,302.50	Legal Services
Des Moines Register	$ 328.65	Legal Publications
Business Publications Corp.	$ 13.11	Legal Publications
Iowa Department of Natural Resources	$ 175.00	NPDES Permit
Iowa Prison Industries	$ 19,750.00	Construction (Fishing Pier)
	$3,029,619.39	
Less WIRB reimbursement	$ (465,000.00)	
	$2,564,619.39	


Downstream end -->
Upstream start -->
Looking south

West Bioswale During Construction

West Bioswale Check Dam

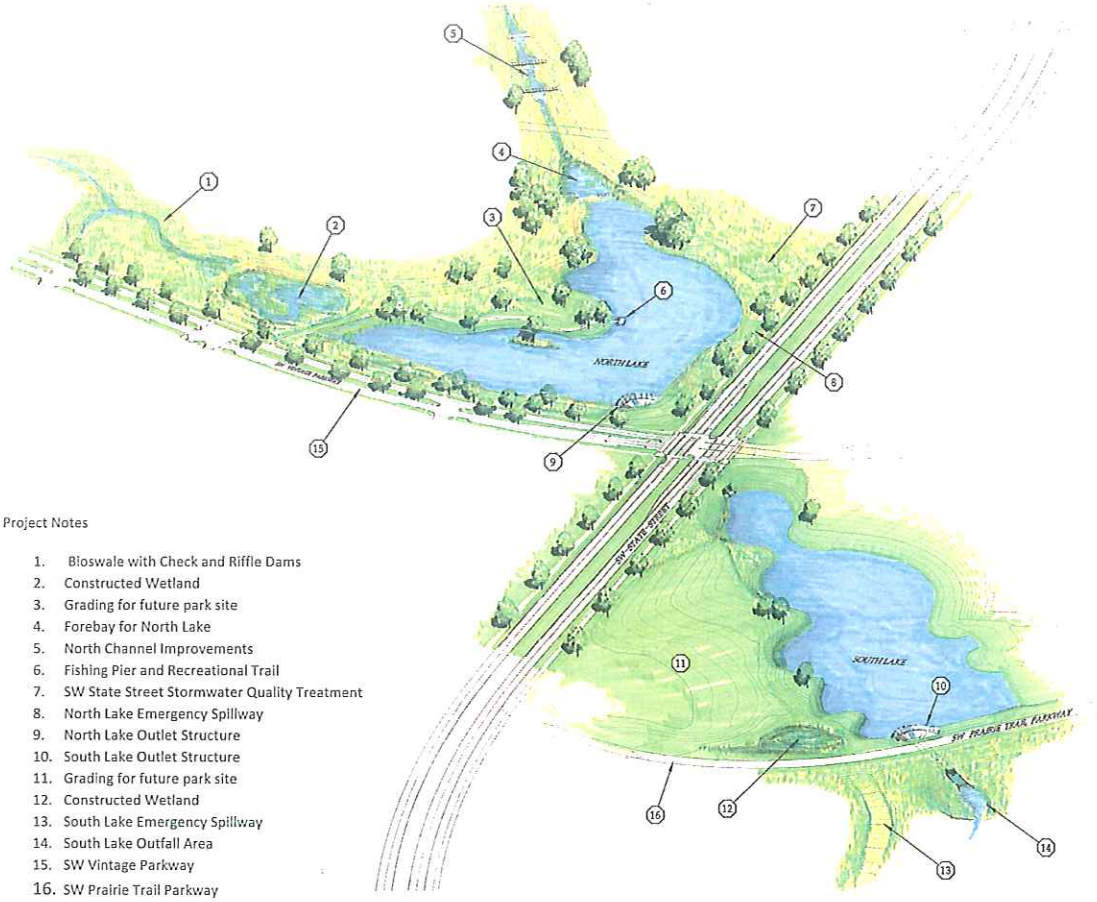
Fish spawning bed in foreground, underwater habitat in background

Forebay weir with maintenance crossing

Sediment forebay overflow weir during rain event

South Bioswale with Check Dams

Pervious pavement in alley



Project Notes

1. Bioswale with Check and Riffle Dams
2. Constructed Wetland
3. Grading for future park site
4. Forebay for North Lake
5. North Channel Improvements
6. Fishing Pier and Recreational Trail
7. SW State Street Stormwater Quality Treatment
8. North Lake Emergency Spillway
9. North Lake Outlet Structure
10. South Lake Outlet Structure
11. Grading for future park site
12. Constructed Wetland
13. South Lake Emergency Spillway
14. South Lake Outfall Area
15. SW Vintage Parkway
16. SW Prairie Trail Parkway

Looking north

Looking north

Iowa Wetlands

city of Ankeny
bringing it all together

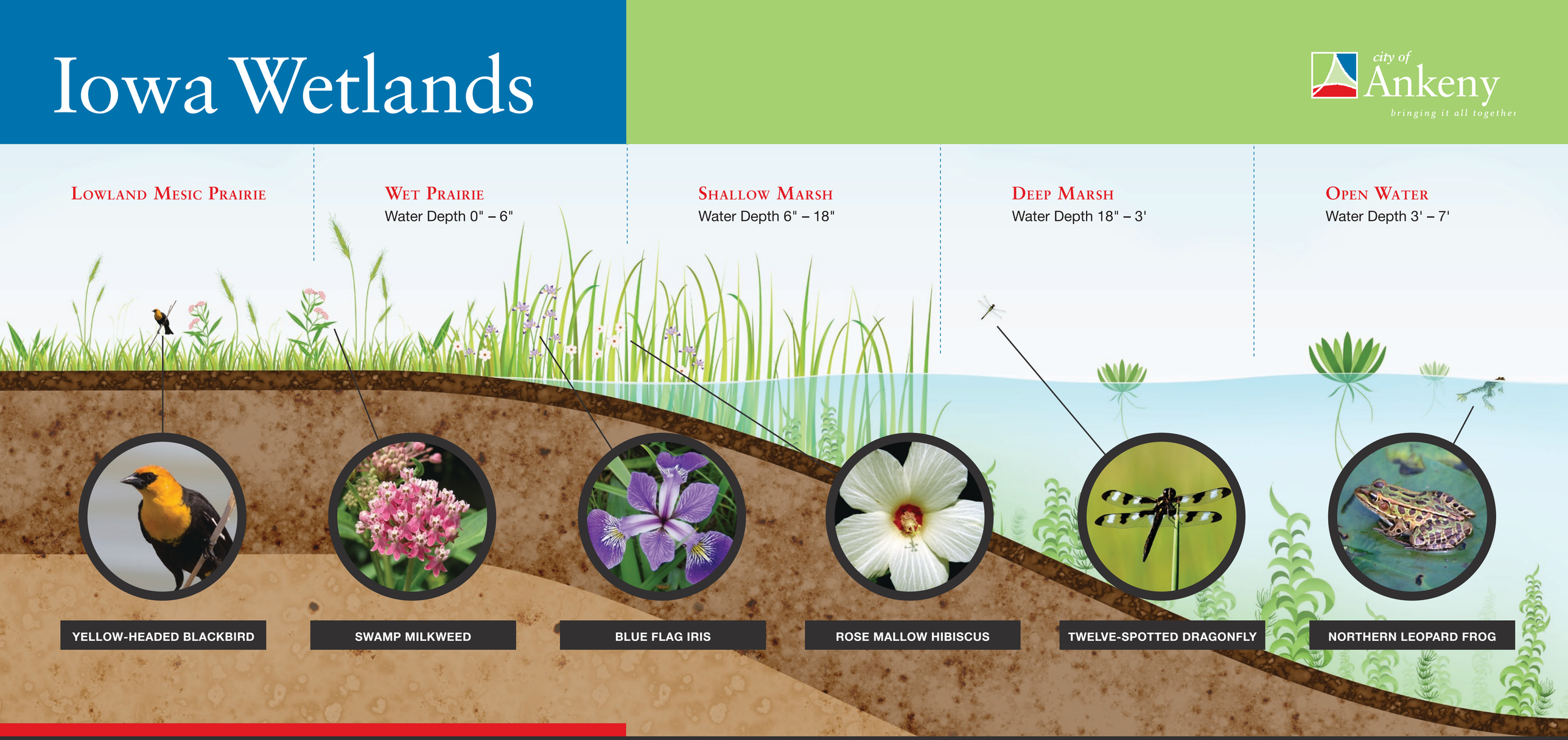
Lowland Mesic Prairie

Wet Prairie
Water Depth 0" – 6"

Shallow Marsh
Water Depth 6" – 18"

Deep Marsh
Water Depth 18" – 3'

Open Water
Water Depth 3' – 7'



YELLOW-HEADED BLACKBIRD

SWAMP MILKWEED

BLUE FLAG IRIS

ROSE MALLOW HIBISCUS

TWELVE-SPOTTED DRAGONFLY

NORTHERN LEOPARD FROG

Wetlands Support Plants and Wildlife

More than 1,200 species of plants are found in US freshwater wetlands.

Deep roots make these plants tough enough to survive droughts and floods. The beautiful flowers and sturdy nature of the leaves and stems typical of wetland plants also provide excellent habitat for a wide variety of birds, animals, and invertebrates. Can you find any Blue Flag Iris or Rose Mallow Hibiscus? What about a dragonfly or frog? Keep looking for cranes, ducks, turtles, fish and butterflies. Wetlands are ideal places to find a diverse collection of Iowa's native species and wild heritage.

Wetlands Restore the Historic Landscape

Wetlands, marshes, sloughs and bogs are just a few names for the places where water and earth meet.

As the glaciers retreated over 10,000 years ago, a variety of wetlands were left behind in Northern and Central Iowa. More than 95 percent of our original wetland habitats no longer exist. Early pioneers found thousands of prairie potholes in north central Iowa, often as many as 200 in a square mile. Constructed Wetlands such as this one are designed for their many benefits, but they also serve to honor a small piece of Iowa's historic landscape.

Wetlands Improve Water Quality

Wetlands absorb and filter pollutants from water runoff.

As wetlands collect water during snow melt or a rainfall, the water slows down and travels through plants and soil. Many chemicals and sediments are removed. During this process plants use up excess nitrogen (the most common pollutant in Iowa's drinking water). The water leaves the wetland in several ways. Whether flowing across the surface towards a lake, descending through the soil towards the groundwater, or evaporating into the air, wetlands clean!

Wetlands Store Stormwater

When it rains, hard surfaces such as roofs, streets, parking lots, and areas of compacted soil are unable to absorb the rainwater and stormwater runoff is created.

The water moves quickly down swales and pipes combining to overwhelm creeks and rivers causing flooding and erosion. Wetlands can intercept and temporarily store runoff without damage to plant species adapted to periodic flooding. Once the storm passes, the wetland slowly releases the water until levels return to normal. Wetlands protect downstream lakes and rivers.