Galloway Creek Sub-Watershed: Assessment & Education Campaign

By: Jake Pulfer & Steve Zweber

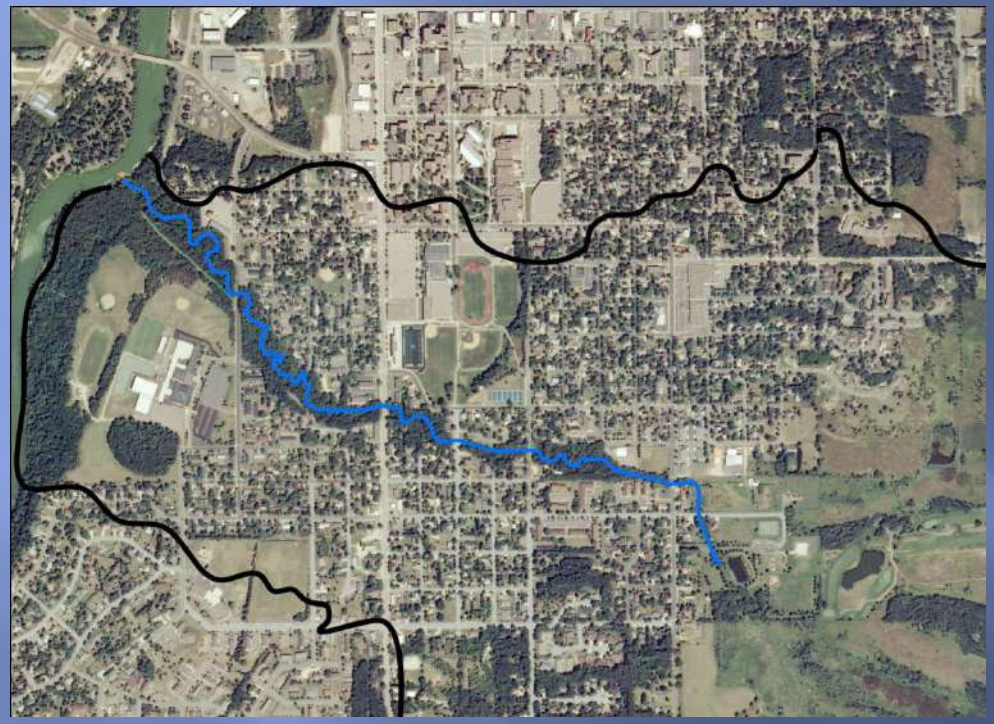
Urban Stream Water Quality Issues

- Impervious surfaces result in flashy storm runoff and reduced groundwater levels.
- Street runoff adds further to the problem.
- Decreased replenishment of stream water from groundwater during dry periods results in low water levels upstream.
- Flash flooding poses threat to stream bank stability and results in erosion.

Research Objectives

- Quantify the volume of pollutants delivered to the Red Cedar River via Galloway Creek.
- Assess use of stormwater BMPs by home-owners in the adjacent watershed.
- Create Galloway Creek Protection Group

Galloway Creek Sub- Watershed



Land use	Area (%)
Single Family	20
Multi-Family	25
Commercial	5
Crops	5
Grassland	20
Woodland	25

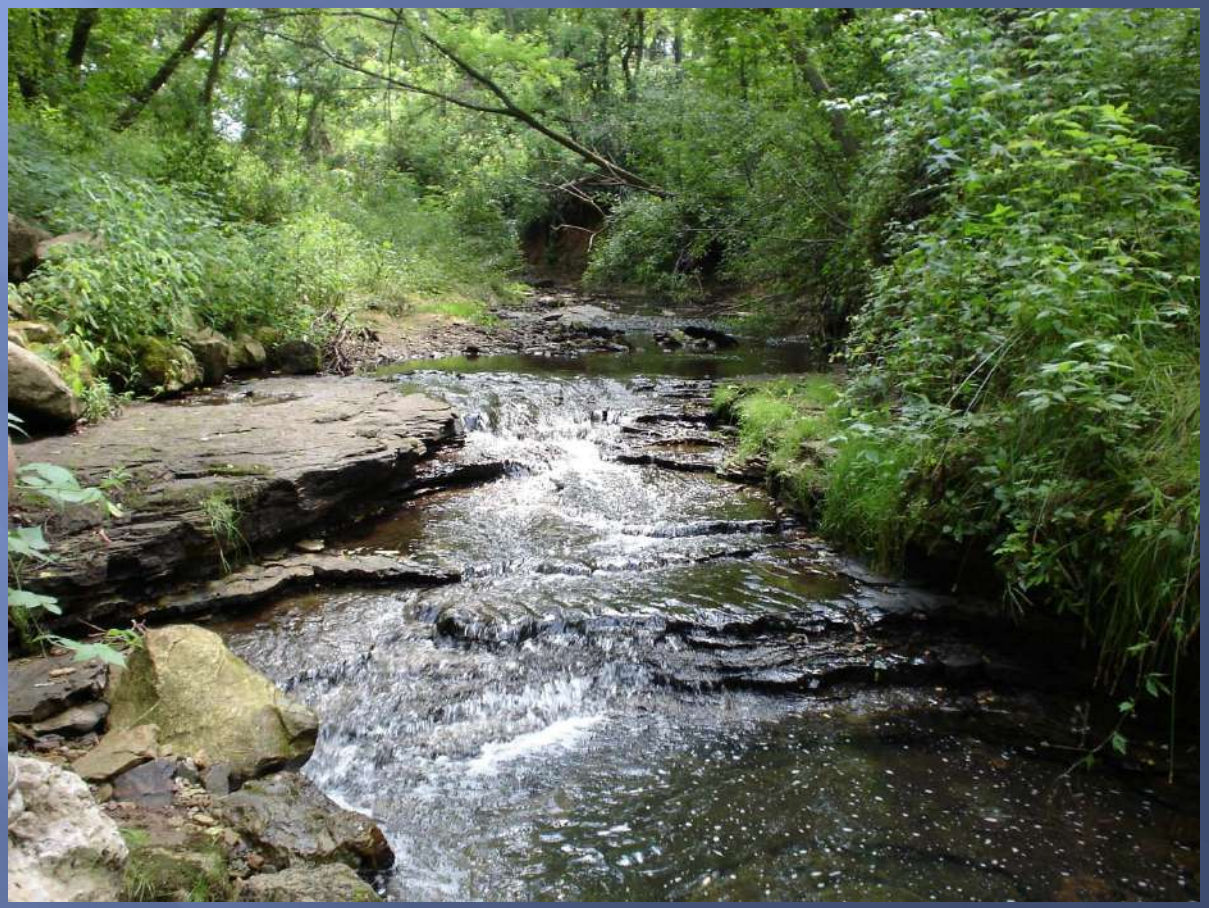
Galloway Creek drains a 3 mi^2 sub-watershed

Urban land uses account for ~ 50% of the watershed area.

Base flow groundwater contributes to flow.

Creek is channelized along most of its length.

Continuous Stream Monitoring



2008-2010 Red Cedar River Enhancement Fund (RCREF) Research Study

Water Sampling

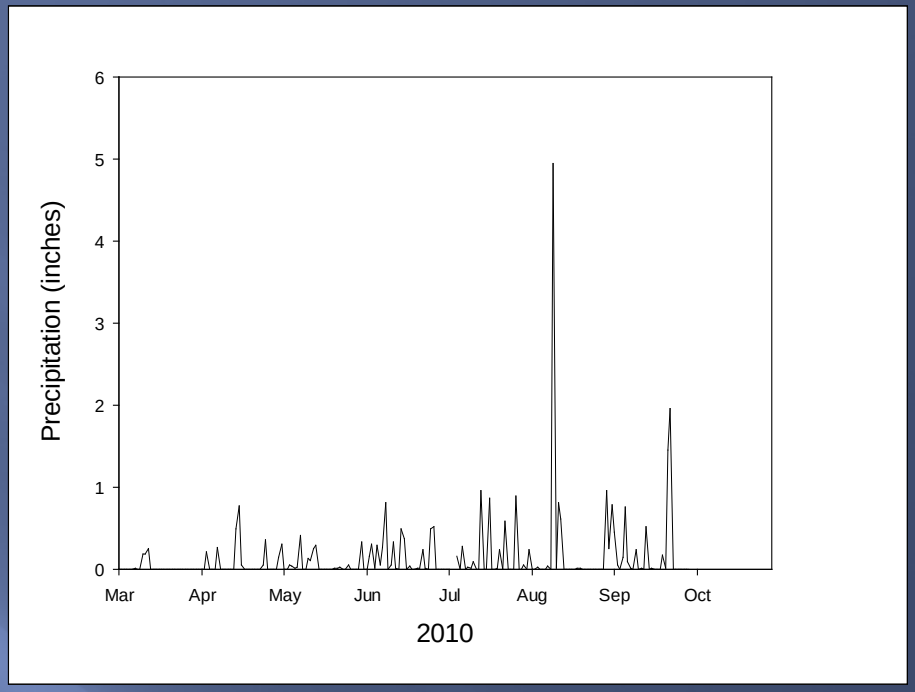
Stage elevation monitored continuously using a sensor.

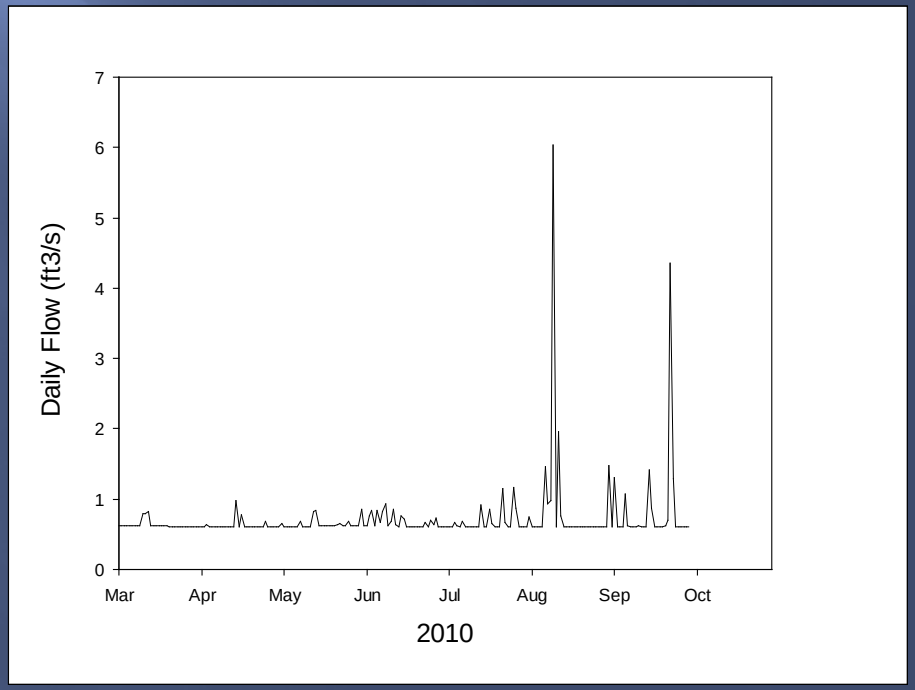
Automated storm water sampling to collect samples during the initial flush and over a 1 hour period

Data stored on a GL400 Data Logger (Global Water Co.)

What does the continuous monitoring data tell us about Galloway Creek?

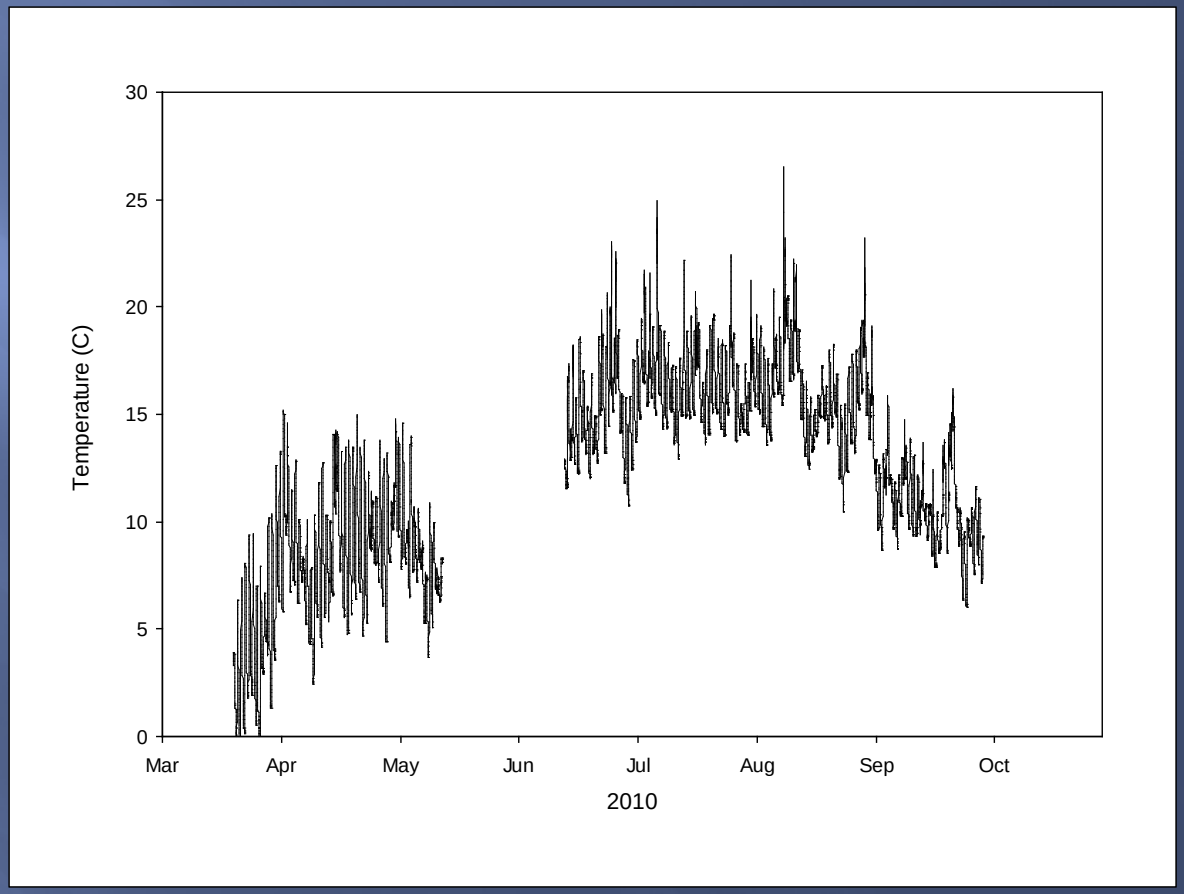
- Peaks in stream discharge were associated with storms.
- Discharge was very flashy during storms indicating rapid runoff from the watershed.
- The high percentage of impervious surfaces probably resulted in high velocity storm flows.



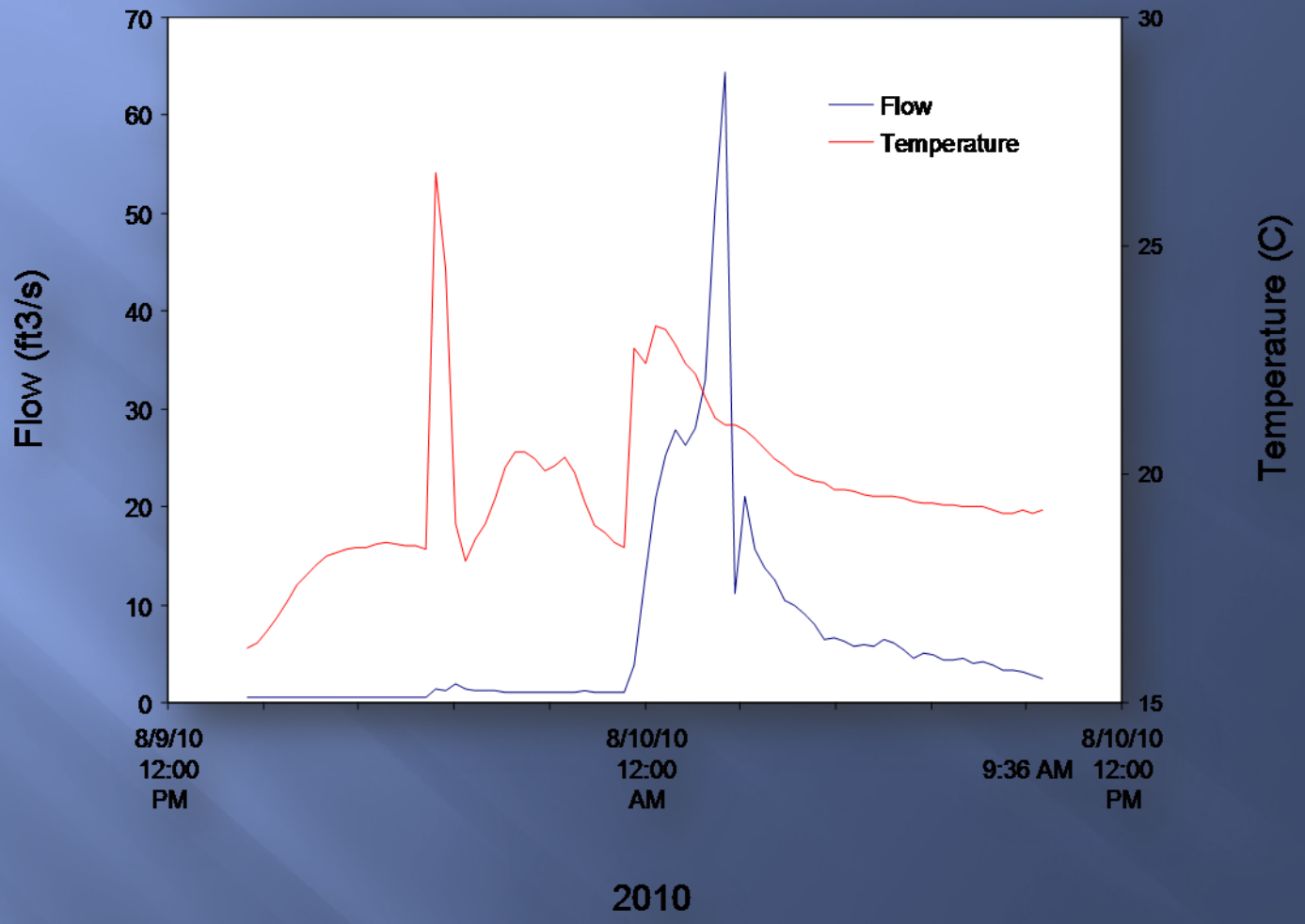


Water Temperature

- During storms, water temp increased abruptly due to runoff.
- Temp increases caused by heating of runoff from impervious surfaces.



Water Temperature



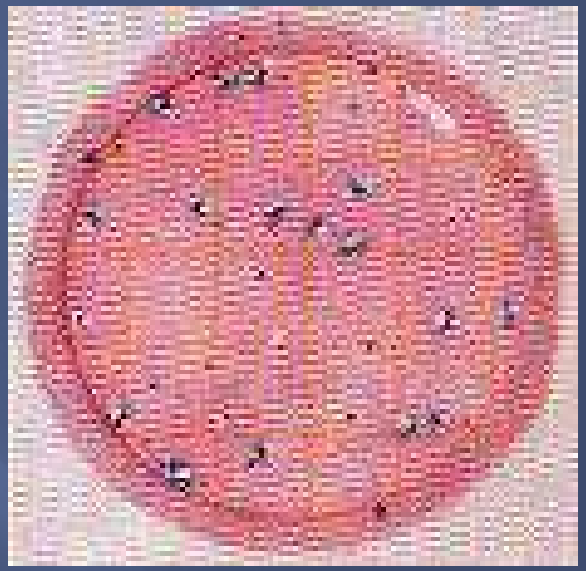
Sediment, P, & N concentrations were comparable to those reported for urban streams in the Minneapolis-St. Paul, MN area and from the Nationwide Urban Runoff Program.

Variable	Mean Concentration		
	Galloway	Twin Cities[1]	Nationwide Runoff Program[2]
TSS (mg/L)	95	184	174
Total P (mg/L)	0.306	0.58	0.337
Soluble P (mg/L)	0.055		0.100
Total N (mg/L)	2.729	3.08	2.507
Nitrate (mg/L)	1.345	0.53	0.837
Ammonium (mg/L)	0.254		

Mean Galloway Creek, Minneapolis-St. Paul area streams, and Nationwide Runoff Program data concentrations (mg/L) of Total Suspended Solids (TSS), Total and Soluble Phosphorus (P), Total Nitrogen (N), Nitrate, and Ammonium (Brezonik & Stadelmann, 2002; adapted from Lin, 2004).

Fecal Coliform Results

- Fecal coliform and E. coli levels increased during storms
- EPA guidelines for swimming restrictions are typically (100 col/100 mL).
- Thus, runoff from the Galloway Creek watershed is a source of fecal contamination.



BIO 111
In-stream
&
Riparian Area
Trash Tally

Where did you start?	
Where did you stop?	
DATE	
NAMES OF STUDENTS	

TRASH ITEM TALLY (Tally with (▪) if found in Stream or immediately next to stream, and (**I**) if in Riparian area)

PLASTIC	# Stream	# Riparian
Cigarette Butts (plastic foam filters)		
Plastic Bags		
Plastic Bottles		
Plastic Bottle Caps		
Plastic Cup, Lid, Straw		
Plastic Six-Pack Rings		
Plastic Wrapper		
Styrofoam Cup/Pieces		
Styrofoam Peanuts		
Other (write-in)		

METAL	# Stream	# Riparian
Aluminum Foil		
Aluminum Cans		
Steel Cans		
Other (write-in)		

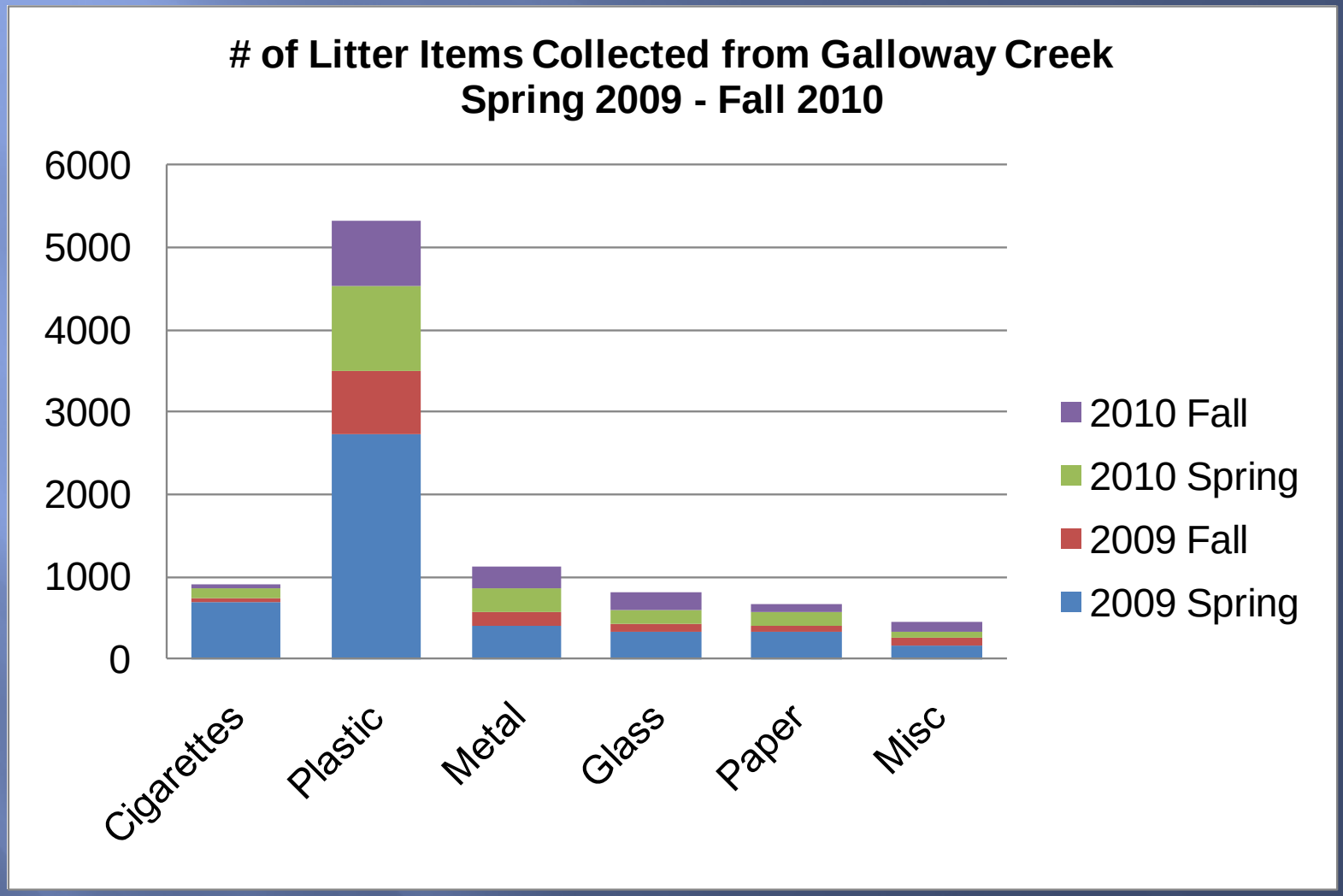
GLASS	# Stream	# Riparian
Glass Bottles		
Glass Pieces		
Other (write-in)		

MISC	# Stream	# Riparian
Appliances		
Furniture		
Car Batteries		
Tires		
Garbage Bags of Trash		
Other (write-in)		

PAPER	# Stream	# Riparian
Paper Cups		
Printer Paper		
Newspaper		
Magazines		
Paper Cartons (soda/beer)		
Other (write-in)		

PLEASE ADD YOUR COMMENTS ON THE BACK

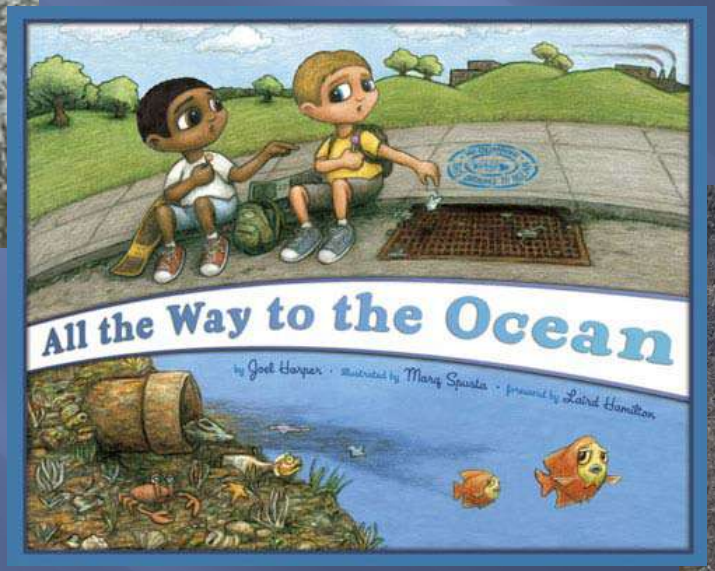
What does the BIO 111 trash tally data tell us about Galloway Creek?

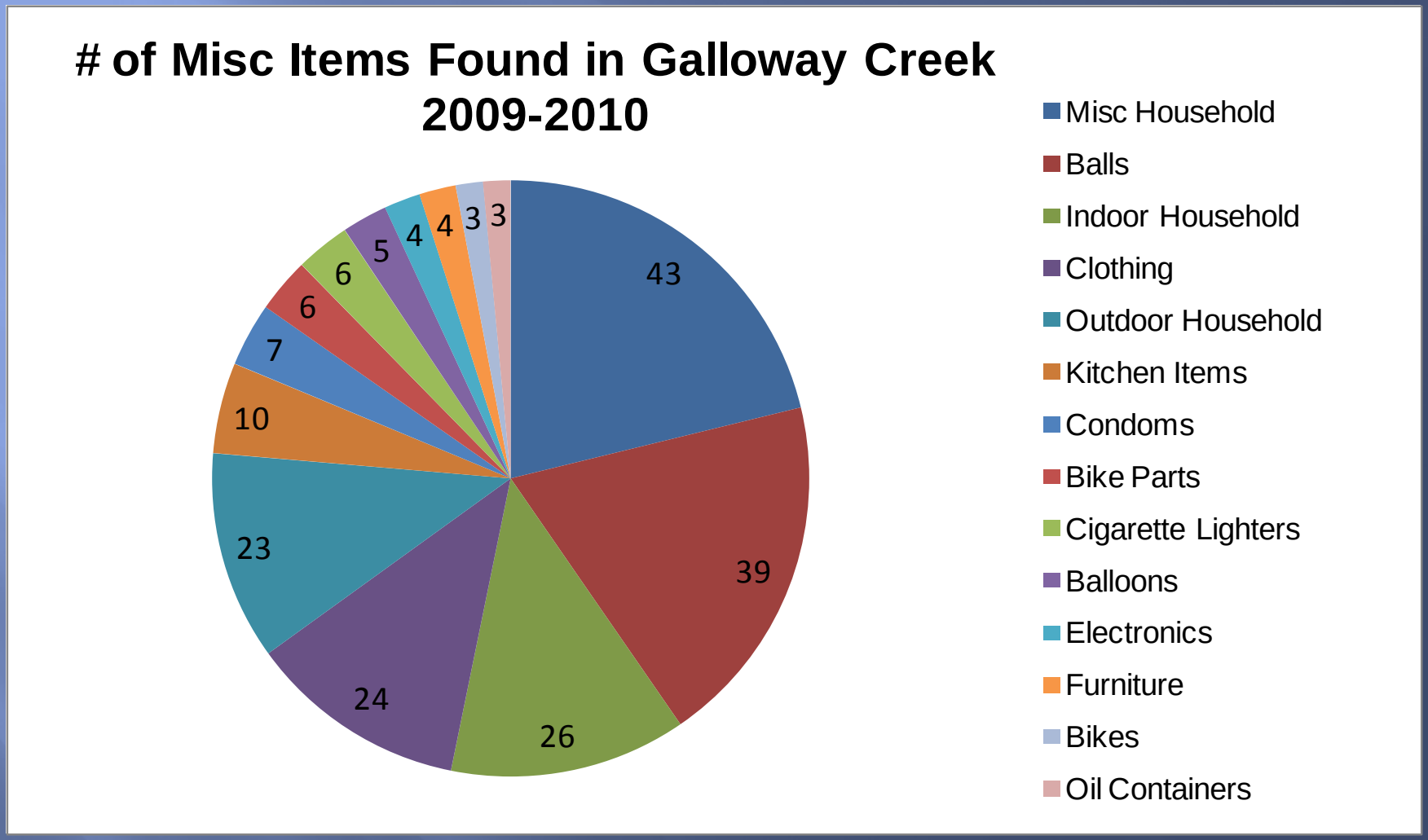


The number of litter items collected from Galloway Creek during the fall and spring semesters of 2009-2010.

Litter Type	Total #	% in Stream
Cigarette butts	908	72
Plastic	5332	48
Metal	1111	32
Glass	803	37
Paper	658	27
Misc	459	46

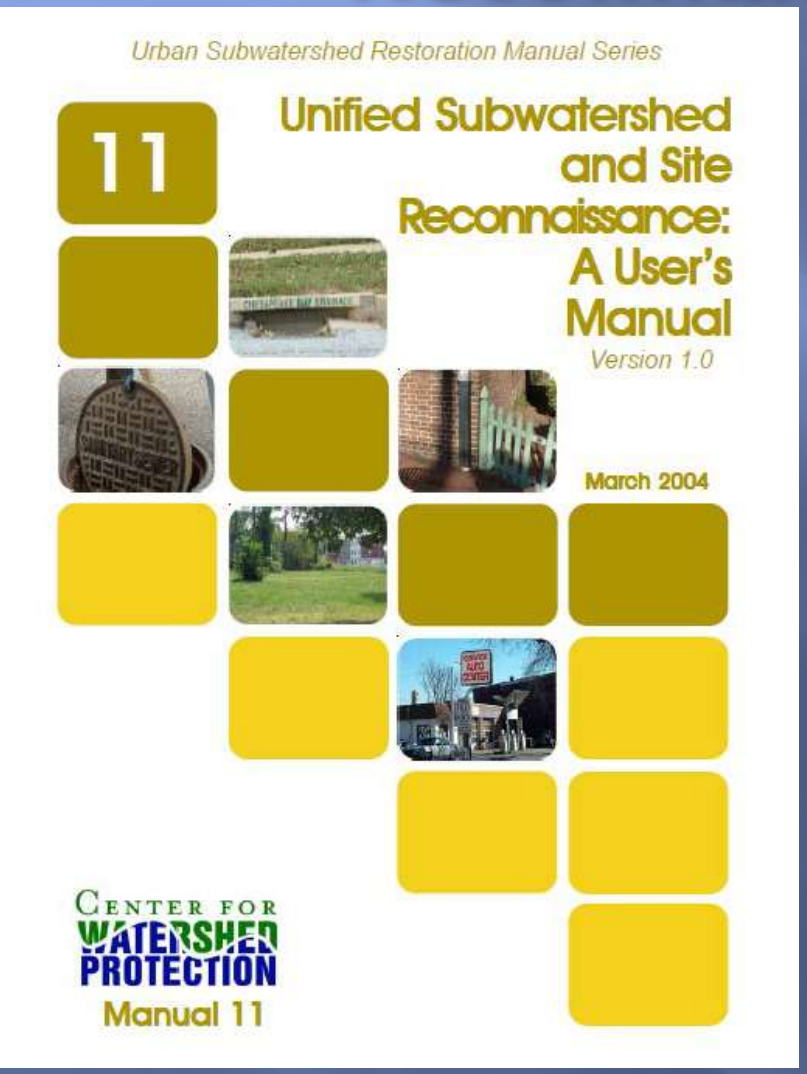
Litter by type and the percentage collected from the stream bed of Galloway Creek (2009-2010 data combined).





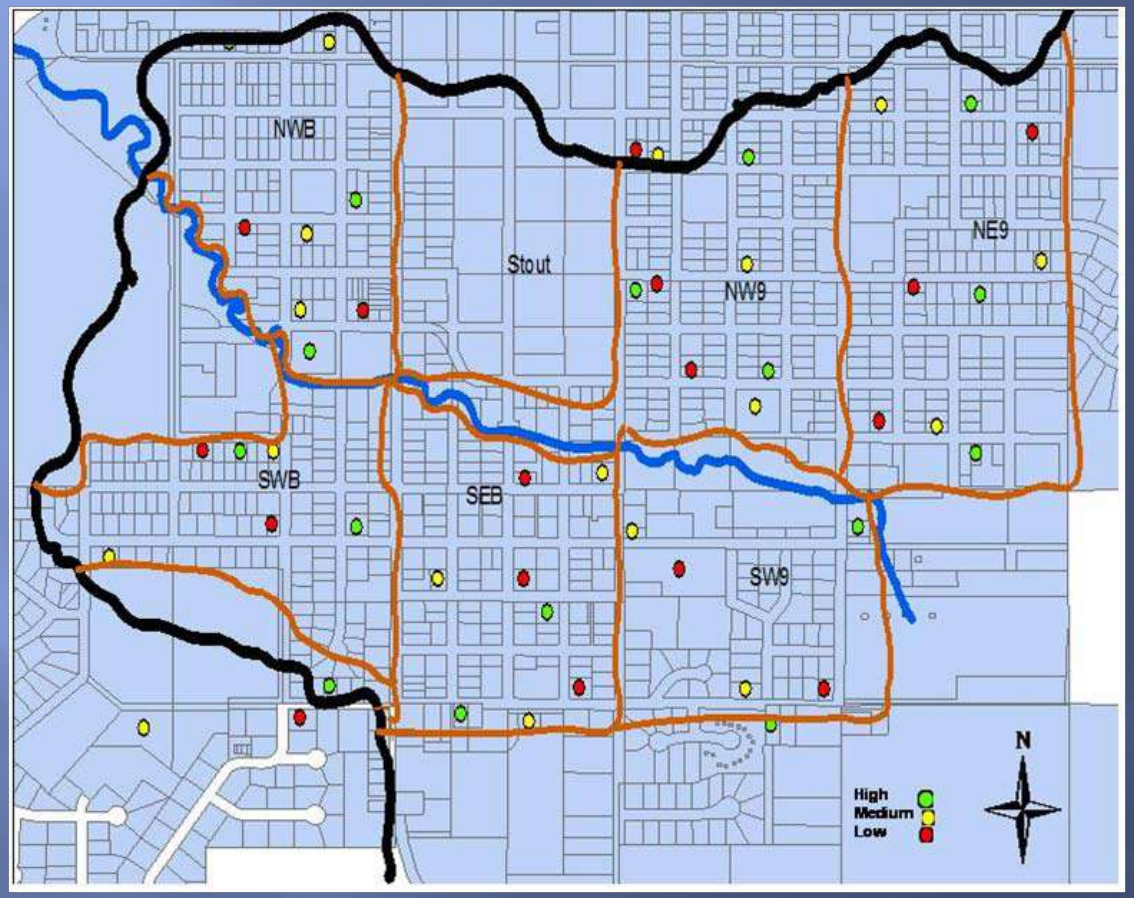
The number of miscellaneous litter items collected from Galloway Creek during the fall and spring semesters of 2009-2010.

Unified Sub-Watershed and Site Reconnaissance Survey



- A USSR assesses for possible pollution sources and restoration opportunities.

- Galloway sub-watershed was divided into 6 neighborhoods.



Total of 51 homes assessed

- Three ~ equidistant streets were chosen from each neighborhood.

What does the USSR data tell us about Galloway Creek?

Figure C-3. The Various Conditions of Downspout Disconnection in the USSR

- Only 43 percent of homes currently have downspouts directed to pervious surfaces.

Disconnected; Flowing to Rain Barrel

- 8 percent of homes have downspouts diverted to rain barrel.

Disconnected; Flowing to Rain Garden

- 94% of homes had more than twenty-five percent of land area as impervious cover
- Only 2 percent of homes had adequate landscaping to retain rainwater.

Education Campaign

- 100 houses visited within the Galloway Creek Sub-watershed

THE GALLOWAY CREEK NEEDS YOUR HELP!

You can take action to make a difference in the future health of our nation's waters!

DID YOU KNOW?

- Most of Galloway Creek's watershed consists of impervious surfaces that block groundwater recharge and increase polluted runoff

- Most of the trash and polluted water that enters storm drains in the City of Menomonie goes directly to Galloway Creek, Red Cedar River and Lake Menomin

- Galloway Creek flows directly to the Red Cedar River which flows into the Chippewa River, which flows into the Mississippi River, which empties into the Gulf of Mexico

Galloway Creek is a three mile urban stream that winds through the heart of Menomonie, WI.

WHAT NEEDS TO HAPPEN?

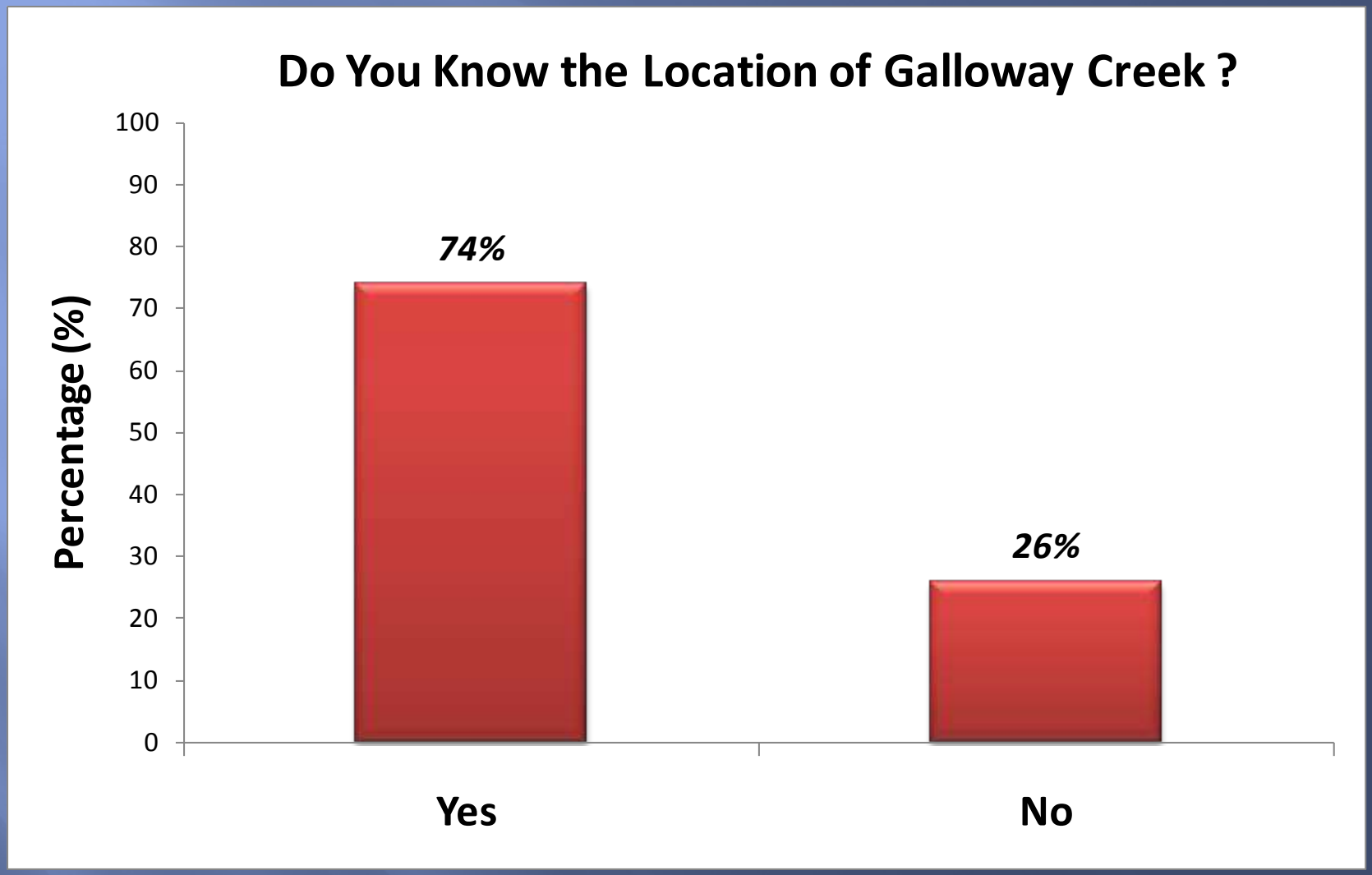
- Restoration of the creek to improve wildlife habitats, water quality, and property values
- Conversations with West Wisconsin Land Trust and the City of Menomonie to create conservation easements
- Easements will provide access for grant supported restoration projects.
- Projects might include step pools, riffles, and rain gardens.

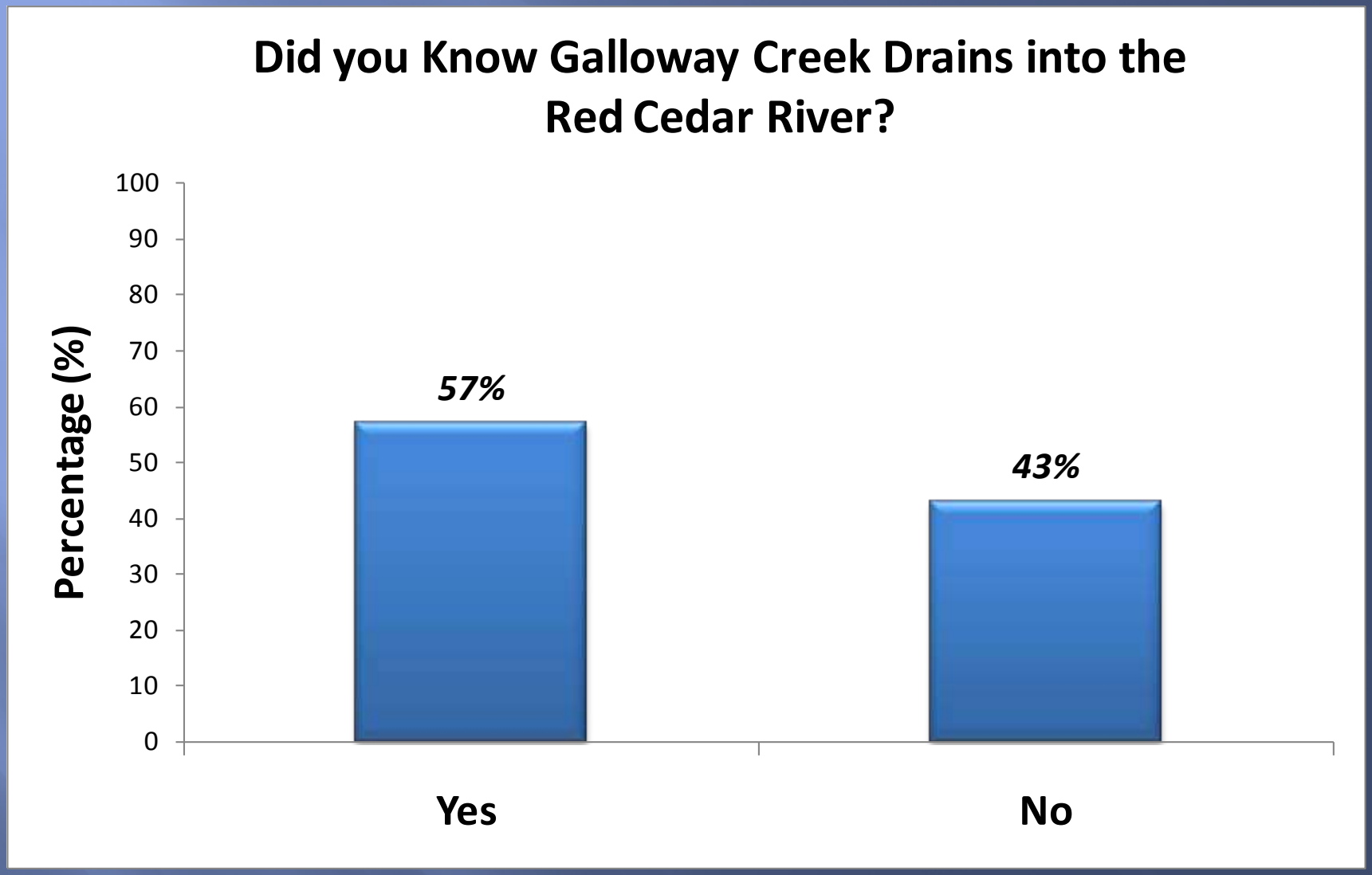
It will take a community-wide effort to protect and restore Galloway Creek. Please donate to the Galloway Creek Protection Fund, make checks payable to Greater Menomonie Area Community Foundation (GMACF).

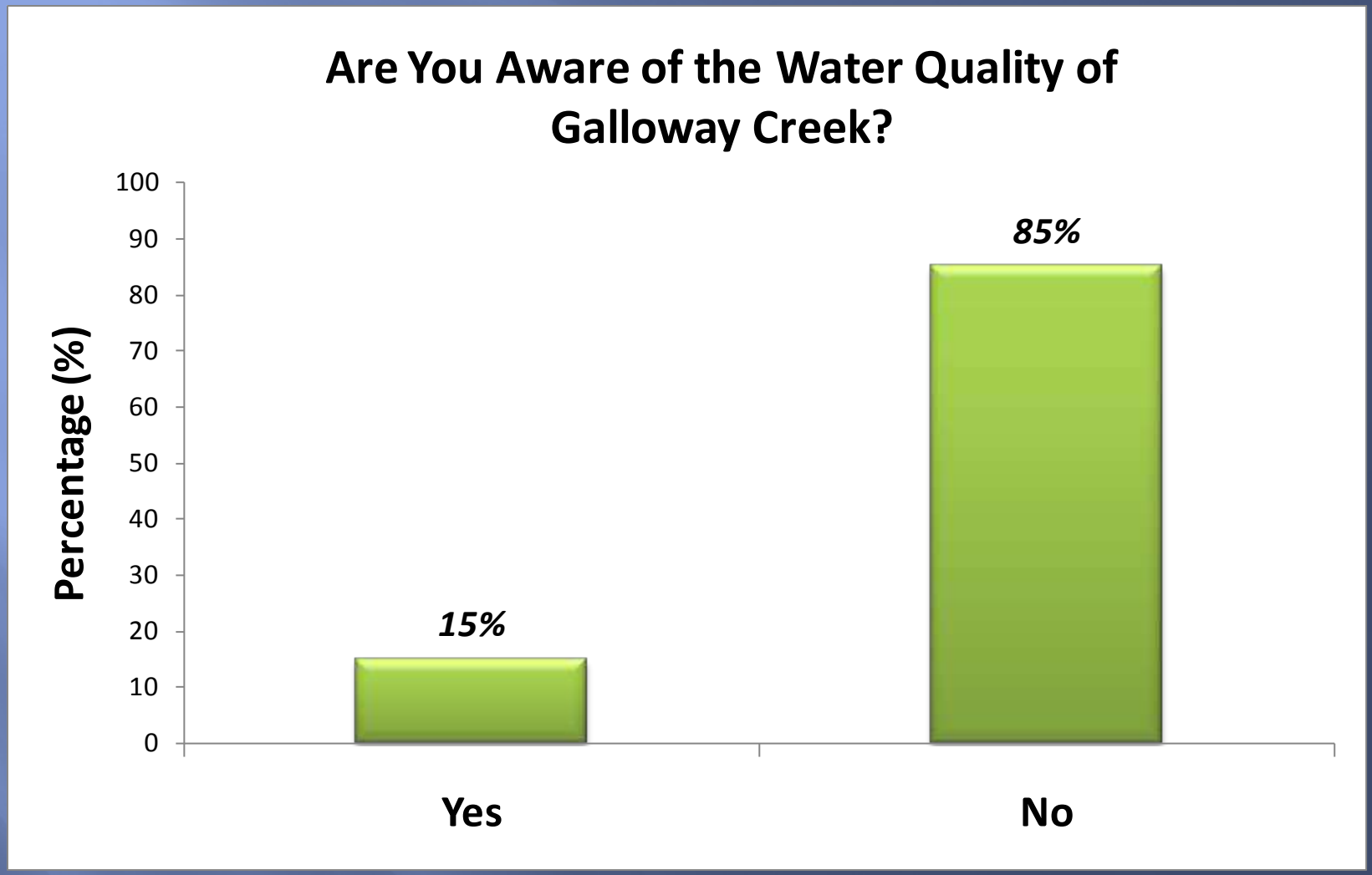
For further information, please contact Krista James, Biology Department, at 715-220-7466 or jamesk@uwstout.edu

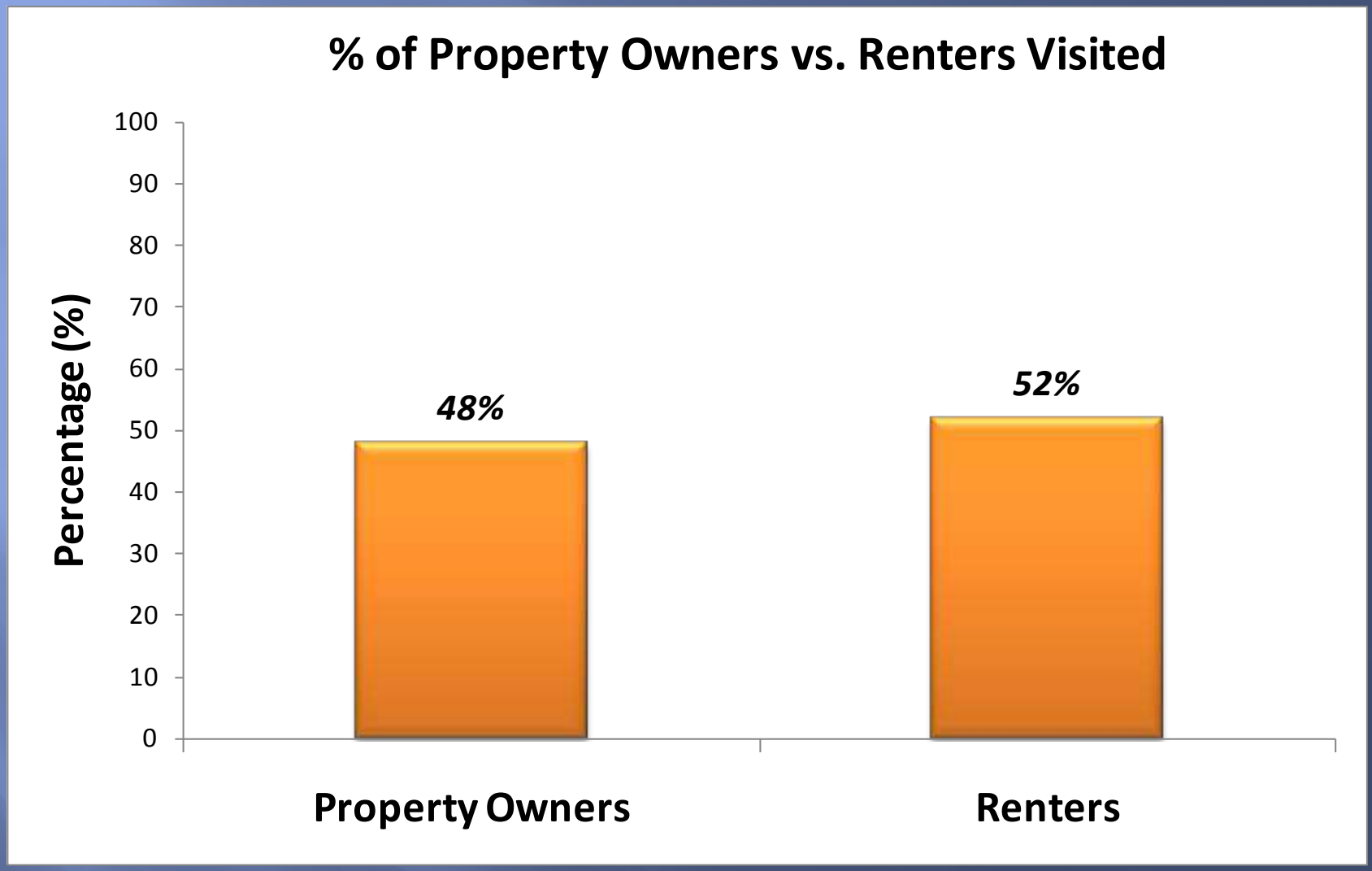
- Information shared about research project.
- People asked to complete a short questionnaire.
- Meetings with Property Management businesses.

What does the education campaign data tell us about Galloway Creek?


Do You Know the Location of Galloway Creek ?
Percentage (%)
100
90
80
70
60
50
40
30
20
10
0
74%
26%
Yes
No


Did you Know Galloway Creek Drains into the Red Cedar River?
Percentage (%)
100
90
80
70
60
50
40
30
20
10
0
57%
43%
Yes
No


Are You Aware of the Water Quality of Galloway Creek?
Percentage (%)
100
90
80
70
60
50
40
30
20
10
0
15%
85%
Yes
No


% of Property Owners vs. Renters Visited
Percentage (%)
100
90
80
70
60
50
40
30
20
10
0
48%
52%
Property Owners
Renters

What is the 5 year plan for protecting Galloway Creek?

Form a Galloway Creek Protection group

Maintain the door-to-door education program using BIO 111 service learning projects.

Assist residents and property management groups in incorporating storm-water best management practices to divert runoff from storm drains.

Moose Lodge

Galloway Apts

Work with the City of Menomonie, Sustainable Dunn, and Tainter & Menomin Lake Improvement Association to reduce and, eventually, eliminate storm water discharges to Galloway Creek