2016 HLWD WATER QUALITY RESULTS

CATHERINE WEGEHAUPT
WATERSHED TECHNICIAN
JULY 2017 BOARD MEETING
HLWD Monthly Rainfall Averages

MONTHLY RAINFALL AVERAGES (INCHES)

- June 2014
- April-July, September 2016
- May, August, November 2015

MONTHLY AVERAGE: 2014 (Yellow), 2015 (Green), 2016 (Blue)
2016 OKABENA CREEK HYDROGRAPH

MEAN DAILY DISCHARGE (CFS)

PRECIPITATION (INCHES)

MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER

GRAB SAMPLES
HERON LAKE OUTLET
2015 HYDROGRAPHS-ALL SITES

MEAN DAILY DISCHARGE (CFS)

JACK CREEK
OKABENA CREEK
HERON LAKE OUTLET

HGWD AVERAGE DAILY PRECIPITATION (INCHES)
HLWD STAFF MONITORING

• MONITOR WATER LEVELS
  • TRANSDUCER SIGNAL
  • RECORDS A VALUE EVERY 15 MINUTES

• FIELD PARAMETERS
  • PH
  • DISSOLVED OXYGEN
  • TEMPERATURE
  • TRANSPARENCY
  • PHYSICAL CONDITIONS
  • RECREATIONAL SUITABILITY
SAMPLE ANALYSIS

• COLLECT BOTTLE SAMPLES FROM STREAMS DURING RISING, PEAK, FALLING RAIN EVENTS

• LAB PARAMETERS
  • NITROGEN SERIES
    • NITRATE-NITRITE
    • TOTAL KJELDAHL NITROGEN
    • AMMONIA NITROGEN
  • TURBIDITY
  • TOTAL SUSPENDED SOLIDS
  • SUSPENDED VOLATILE SOLIDS
  • DISSOLVED ORTHO PHOSPHORUS
  • TOTAL PHOSPHORUS
  • E.COLI
MONITORING

• DNR DETERMINES IN-STREAM FLOW (CFS)
  • 5-6 TIMES FROM APRIL-OCTOBER
  • DATA COLLECTED IS USED TO DETERMINE LOADINGS

• FLUX 32
  • THE PROGRAM USED TO ESTIMATE THE LOADINGS OF WATER QUALITY PARAMETERS PASSING A MONITORING SITE OVER A GIVEN PERIOD OF TIME
AVERAGE CONCENTRATIONS VS FLOW WEIGHTED MEAN CONCENTRATIONS

CONCENTRATION:
THE AMOUNT OF A SUBSTANCE IN A SPECIFIC AMOUNT OF WATER AT ONE POINT IN TIME.

FLOW WEIGHTED MEAN CONCENTRATION:
THE CONCENTRATION OF A PARTICULAR POLLUTANT TAKING INTO ACCOUNT THE VOLUME OF WATER PASSING A SAMPLING STATION OVER THE ENTIRE SAMPLING SEASON.
TOTAL SUSPENDED SOLIDS
TOTAL SUSPENDED SOLID (TSS) AVERAGE CONCENTRATIONS

Water Quality Standard
65 mg/L
TOTAL SUSPENDED SOLIDS FLOW WEIGHTED MEAN CONCENTRATIONS

- **Jack Creek**
- **Okabena Creek**
- **Heron Lake Outlet**

Graph showing the total suspended solids flow weighted mean concentrations from 2003 to 2016 for Jack Creek, Okabena Creek, and Heron Lake Outlet.
TOTAL PHOSPHORUS

Sediments from land block sunlight
Sedgegrass

These nutrients cause an increase in phytoplankton
Phytoplankton growth on Sedgegrass

Nitrogen
Phosphorus

Algae Bloom
Algae Die
Decay

Oxygen

Eutrophication in Water Pollution
ORTHO PHOSPHORUS
ORTHO PHOSPHORUS AVERAGE CONCENTRATIONS

- OKABENA CREEK
- JACK CREEK
- HL OUTLET

Bar chart showing ORTHO PHOSPHORUS AVERAGE CONCENTRATIONS from 2005 to 2016.
AVERAGE NITRATE AND NITRITE CONCENTRATIONS

Water Quality Standard 10 mg/L
NITRATE AND NITRITE FLOW WEIGHTED MEAN CONCENTRATIONS

JACK CREEK
OKABENA CREEK
HERON LAKE OUTLET

LINEAR (JACK CREEK)
LINEAR (OKABENA CREEK)
LINEAR (HERON LAKE OUTLET)
LOADING:

THE TOTAL AMOUNT OF A POLLUTANT RECEIVED BY A WATER RESOURCE DURING A FIXED PERIOD OF TIME.

(MARCH-OCTOBER)
ORTHO PHOSPHORUS LOADINGS

LOADINGS (KILOGRAMS)

ANNUAL PRECIPITATION (INCHES)

I3-OKABENA CREEK
I4-JACK CREEK
O3-HERON LAKE OUTLET

HLWD LAKES

- Sample lakes every three years
- Fulda Lakes, Graham Lakes, and Heron Lakes (six sites)
- Once per month – May through September

Parameters:
- Total phosphorous (TP)
- Ortho phosphorous (OP)
- Total suspended solids (TSS)
- Suspended volatile solids (SVS)
- Nitrate nitrite nitrogen (NO2_NO3)
- Ammonia nitrogen (NH3)
- Total Kjeldahl nitrogen (TKN)
- Turbidity
- Chlorophyll A
AVERAGE CONCENTRATIONS OF TOTAL SUSPENDED SOLIDS


MG/L

FIRST FULDA LAKE
SECOND FULDA LAKE
EAST GRAHAM LAKE
WEST GRAHAM LAKE
NORTH HERON LAKE
SOUTH HERON LAKE
AVERAGE CONCENTRATION OF ORTHO PHOSPHORUS

1997-2002 AVG.

2006

2009

2010

2013

2016

MG/L

FIRST FULDA LAKE

SECOND FULDA LAKE

EAST GRAHAM LAKE

WEST GRAHAM LAKE

NORTH HERON LAKE

SOUTH HERON LAKE
WHAT ARE WE DOING TO HELP IMPROVE WATER QUALITY?

Cover Crops

According to the MN AG Best Management Practices Handbook, cover crops can reduce N leaching by 13-64% through tile lines.

Other benefits include: decreased runoff due to better infiltration and less wind erosion due to increased cover.
According to MN AG Best Management Practices Handbook, conservation tillage practices can reduce up to 90% of surface runoff.
Cedar Revetment - 1 Year
According to the MN AG Best Management Practices Handbook, basin structures can remove, on average, 80% of the sediment.
QUESTIONS?