# ANALYSIS OF

# SPEARFISH CREEK

## FROM SPEARFISH CITY INTAKE DAM IN SECTION 33, TOWNSHIP 6 NORTH, RANGE 2 EAST TO HOMESTAKE HYDROELECTRIC PLANT INTAKE DAM, KNOWN AS MAURICE, IN SECTION 8, TOWNSHIP 5 NORTH, RANGE 2 EAST

# LAWRENCE COUNTY

# SOUTH DAKOTA

## JANUARY 2009

**South Dakota**
**Department of Environment and Natural Resources**
**Division of Environmental Services**
**Pierre, South Dakota**

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## Executive Summary

Name/Location of Waterbody: Spearfish Creek, Lawrence County.

Boundary of Waterbody: Spearfish Creek, from Spearfish City intake dam in Section 33, Township 6 North, Range 2 East, to Homestake Hydroelectric Plant intake dam, known as Maurice, in Section 8, Township 5 North, Range 2 East.

Recommendation: It is recommended that the fishery beneficial use designation of Spearfish Creek, from Spearfish City intake dam in Section 33, Township 6 North, Range 2 East, to Homestake Hydroelectric Plant intake dam, known as Maurice, in Section 8, Township 5 North, Range 2 East be upgraded from (3) Coldwater marginal fish life propagation water, to (2) Coldwater permanent fish life propagation waters. The existing (8) Limited contact recreation waters beneficial use designation is appropriate and will remain.

## Introduction

On a triennial basis, the South Dakota Department of Environment and Natural Resources (DENR) conducts a review of surface water quality standards and waterbody beneficial uses as required by the Clean Water Act.

In August 2008, the South Dakota Department of Game, Fish, & Parks (GF&P) conducted a fish survey in Spearfish Creek. The recommendation by GF&P and the results of their survey are the basis for the fishery use designation reclassification on Spearfish Creek.

## Site Description/Discussion

Spearfish Creek originates in southwestern Lawrence County and flows approximately 35 miles north to the Redwater River. In August 2008, GF&P conducted a fish survey on Spearfish Creek within the segment under review.

GF&P Site 339 is located on Spearfish Creek 0.3 miles downstream of the Maurice Intake (44.411374, -103.893695). The site is a 100 meter stretch and was sampled by completing three passes with a backpack electroshocker. Attachment 6 is a population and biomass estimate for this site on Spearfish Creek and was provided by GF&P. The summary indicates that 345 immature brook trout, 5 mature brook trout, 92 immature brown trout, and 5 mature brown trout were collected at this site. This totals 447 brook and brown trout collected within a 100 meter stretch of Spearfish Creek.

GF&P Site 327 is located on Spearfish Creek one mile downstream from the Maurice Intake (44.413546, -103.881935). This site is a 100 meter stretch and was sampled by completing three passes with a backpack electroshocker. Attachment 6 is a population and biomass estimate for this site on Spearfish Creek and was provided by GF&P. The summary indicates that 245 immature brown trout, 57 mature brown trout, 1 immature brook trout, and 2 immature rainbow

trout were collected at this site. This totals 305 brook, rainbow, and brown trout collected within a 100 meter stretch of Spearfish Creek.

Attachment 7 is a length frequency histogram provided by GF&P. This histogram indicates the presence of multiple age classes of brown trout and brook trout in Spearfish Creek. The majority of all fish collected were less than 200 mm; however, there is a fair number of catchable (>200 mm) brown and brook trout present. Fish are not stocked in Spearfish Creek; therefore, the trout present in Spearfish Creek are a self-sustaining, permanent, wild population of coldwater fish from natural reproduction (Jerry Wilhite, GF&P, personal communication).

WQM MN35 is a water quality monitoring station located on Spearfish Creek near the Spearfish city intake. Water quality data at that station indicate that water meets all water quality criteria for the (3) Coldwater marginal fish life propagation waters beneficial use and for the proposed (2) Coldwater permanent fish life propagation waters beneficial use. Attachment 8 is a summary of five years of water quality data at WQM MN35.

Recreation Waters

The segment of Spearfish Creek under review is designated as (8) Limited contact recreation waters. DENR considers this designation appropriate and does not recommend (7) Immersion recreation waters designation due the creek's physical characteristics. Data from WQM MN 35 indicate the average water depth at that location is 0.4 feet, insufficient depth to submerse or swim. The photograph in Attachment 5 also indicates the shallow nature of the creek at GF&P Site 339. The samplers are wading in only several inches of water. There are no indications of deep pools that would support public swimming, nor signs or knowledge of public swimming occurring. The segment of Spearfish Creek under review flows parallel to US Highway 14A and allows public access along the road right of way; however, there are not any public swim beaches or facilities that would encourage the public to participate in immersion recreation activities.

## Conclusion

Based upon the waterbody survey and recommendation by GF&P, DENR recommends that the fishery beneficial use designation of Spearfish Creek, from Spearfish City intake dam in Section 33, Township 6 North, Range 2 East to Homestake Hydroelectric Plant intake dam, known as Maurice, in Section 8, Township 5 North, Range 2 East be upgraded from (3) Coldwater marginal fish life propagation waters, to (2) Coldwater permanent fish life propagation waters. The existing (8) Limited contact recreation waters beneficial use designation is appropriate and will remain.

## Reference Documents

South Dakota Department of Environment and Natural Resources. 1999. Recommended Procedures for Reviewing Beneficial Use Designations, With Special Emphasis on Fishery and Recreational Uses.

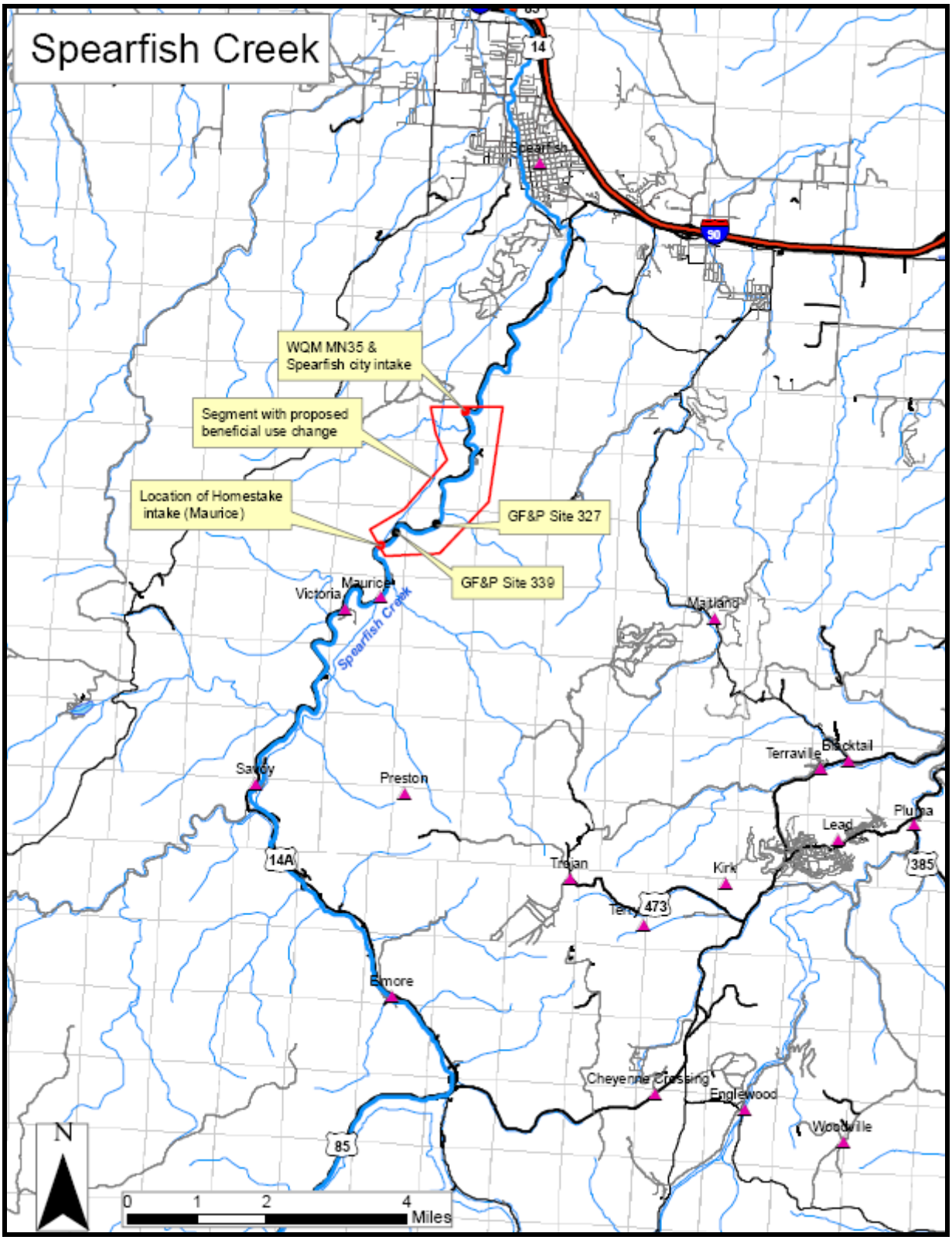
South Dakota Department of Environment and Natural Resources. Chapters 74:51:01, 74:51:02, and 74:51:03, Surface Water Quality Standards.

DeLorme, 2004. South Dakota Atlas and Gazetteer.

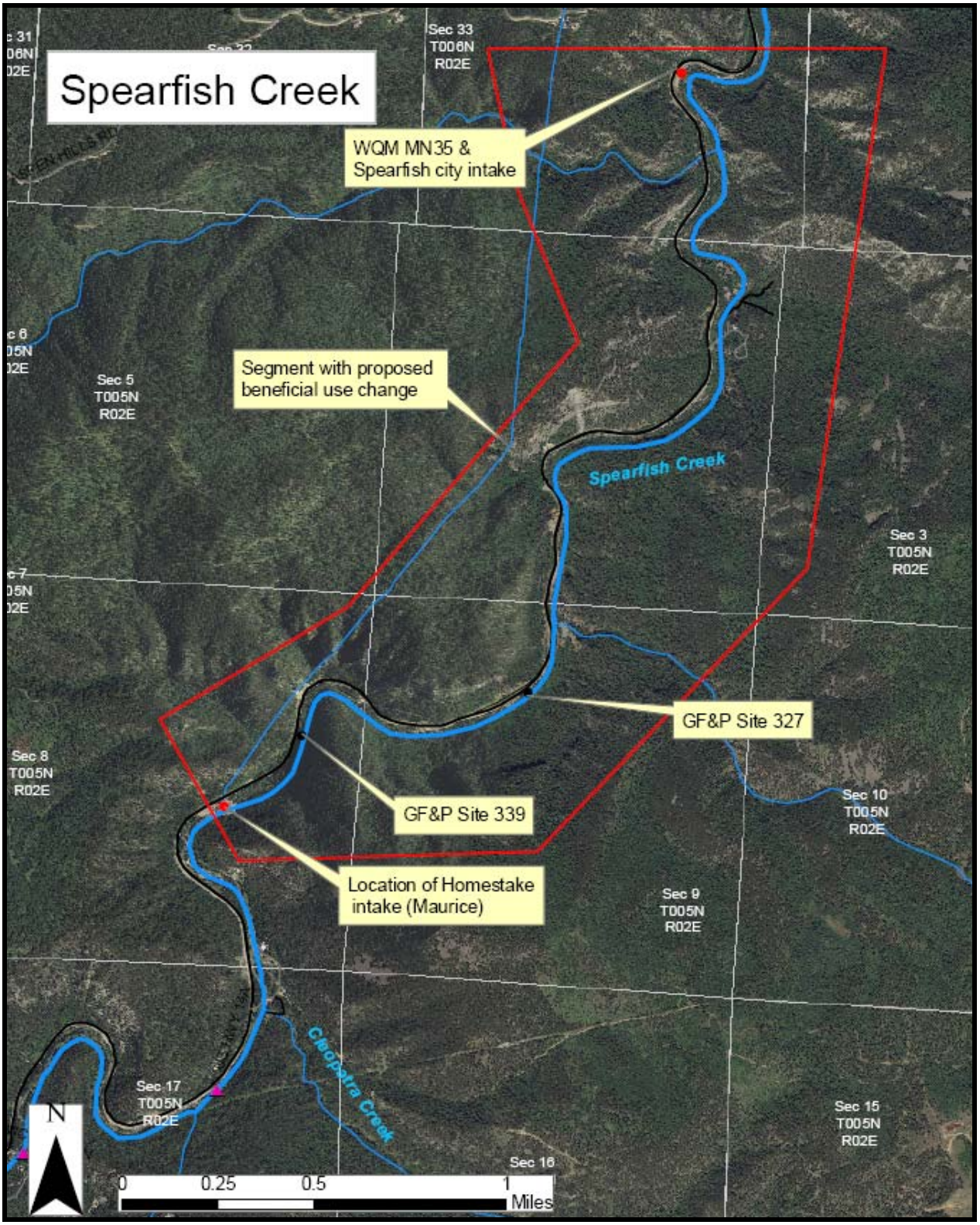
South Dakota Bureau of Information and Telecommunications, GIS ArcMap.

Wilhite, Jerry. 2009. Personal Communication. South Dakota Department of Game, Fish, and Parks. Rapid City, SD.

# ATTACHMENT 1



# ATTACHMENT 2



# ATTACHMENT 3

**Spearfish Creek GF&P Site 327.**
This photograph was taken August 28, 2008, of the bottom net location facing (northeast) downstream. Photo provided by GF&P.

# ATTACHMENT 4

**Spearfish Creek GF&P Site 327.**
This photograph was taken on August 28, 2008, of the top net location facing southwest (upstream). Photo provided by GF&P.

# ATTACHMENT 5

**Spearfish Creek GF&P Site 339.**
This photograph was taken August 28, 2008, of the top net location facing southwest (upstream). Photo provided by GF&P.

# ATTACHMENT 6

Site Number: 327 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: SFC
Legal Description: S9,R2E,T5
Stream Classification: BKT0 BNT1 RBT0

Date Sampled: 28 AUG 2008
Site Length (m): 100
Mean Width (m): 5.1
Number of Passes: 3

Conductivity (µmhos): 432
pH: 8.7
Water Temperature (°C): 9.9
Air Temperature (°C): 20.0

| Species | Size Class | Total Number Captured | Est. # in site | Lower 95% CI | Upper 95% CI | # per hectare | Kg per hectare | # per Km | # per acre | lb. per acre | # per mile | Mean Length (mm) | Mean Weight (grams) | Mean Fulton K-factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brook Trout | <200 mm | 1 | 1 | 1 | 1 | 20 | 0.10 | 10 | 8 | 0.09 | 16 | 85.0 | 5.0 | 0.81 |
| Brook Trout | ALL | 1 | 1 | 1 | 1 | 20 | 0.10 | 10 | 8 | 0.09 | 16 | 85.0 | 5.0 | 0.81 |
| Brown Trout | <200 mm | 245 | 254 | 245 | 263 | 5,016 | 242.60 | 2,540 | 2,032 | 216.62 | 4,087 | 146.2 | 48.4 | 1.12 |
| Brown Trout | ≥200 mm | 57 | 57 | 57 | 58 | 1,126 | 138.06 | 570 | 456 | 123.27 | 917 | 223.5 | 122.6 | 1.08 |
| Brown Trout | ALL | 302 | 310 | 302 | 318 | 6,122 | 405.01 | 3,100 | 2,479 | 361.62 | 4,988 | 162.5 | 66.2 | 1.11 |
| Rainbow Trout | <200 mm | 2 | 2 | 2 | 2 | 39 | 1.20 | 20 | 16 | 1.08 | 32 | 133.0 | 30.5 | 1.12 |
| Rainbow Trout | ALL | 2 | 2 | 2 | 2 | 39 | 1.20 | 20 | 16 | 1.08 | 32 | 133.0 | 30.5 | 1.12 |

Site Number: 339 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: SFC
Legal Description: S8,R2E,T5
Stream Classification: BKT2 BNT2

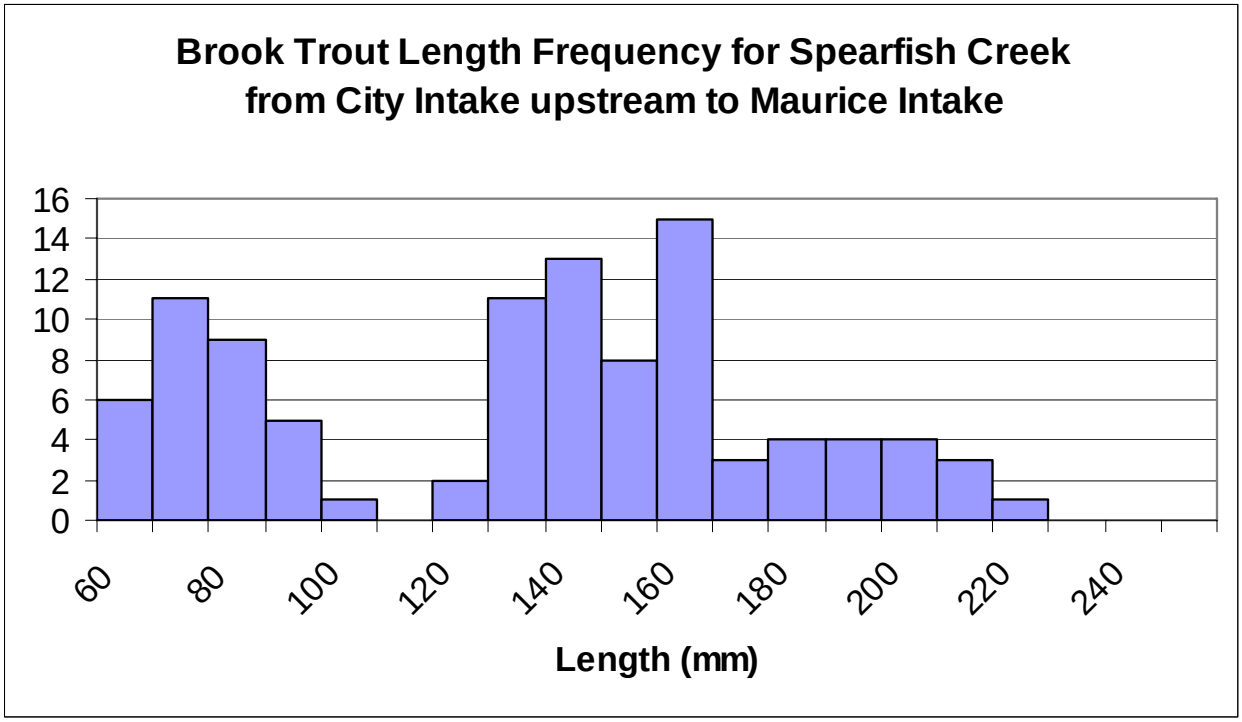
Date Sampled: 28 AUG 2008
Site Length (m): 100
Mean Width (m): 5.3
Number of Passes: 3

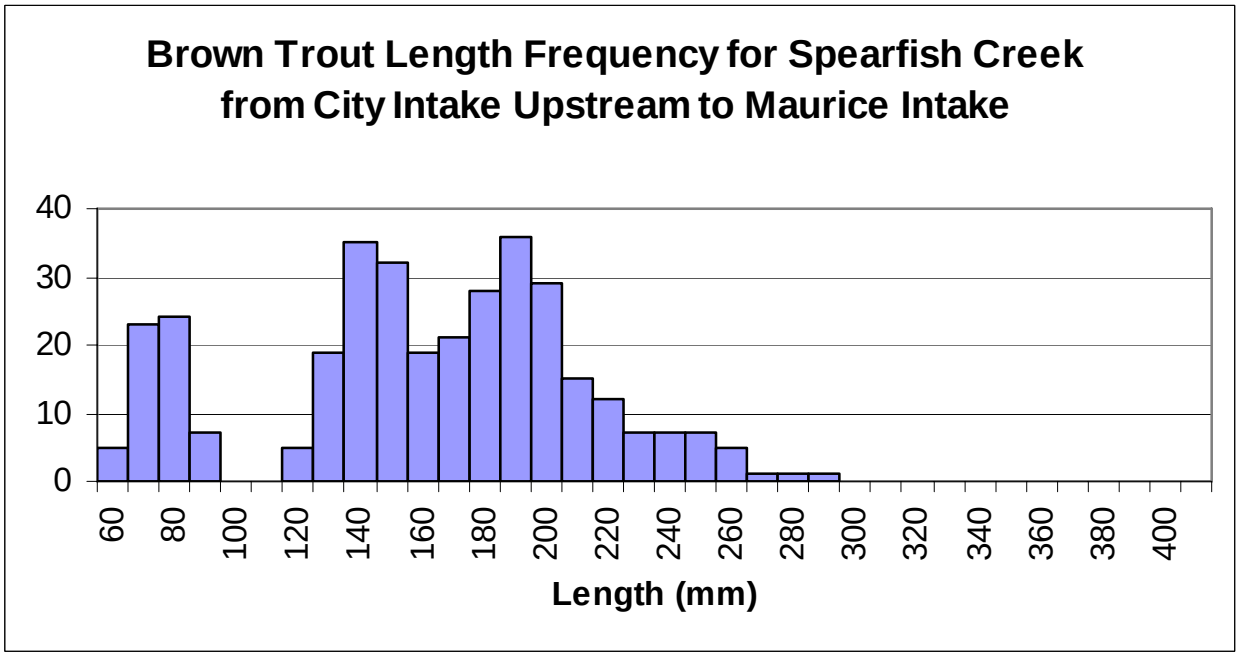
Conductivity (µmhos): 434
pH: 8.5
Water Temperature (°C): 11.8
Air Temperature (°C): 22.9

| Species | Size Class | Total Number Captured | Est. # in site | Lower 95% CI | Upper 95% CI | # per hectare | Kg per hectare | # per Km | # per acre | lb. per acre | # per mile | Mean Length (mm) | Mean Weight (grams) | Mean Fulton K-factor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Brook Trout | <200 mm | 345 | 370 | 354 | 386 | 6,981 | 269.27 | 3,700 | 2,827 | 240.43 | 5,953 | 122.9 | 38.6 | 1.11 |
| Brook Trout | ≥200 mm | 5 | 5 | 5 | 7 | 94 | 10.72 | 50 | 38 | 9.57 | 80 | 206.8 | 113.6 | 1.29 |
| Brook Trout | ALL | 350 | 376 | 359 | 393 | 7,094 | 312.78 | 3,760 | 2,873 | 279.27 | 6,050 | 127.1 | 44.1 | 1.13 |
| Brown Trout | <200 mm | 92 | 101 | 92 | 112 | 1,906 | 84.75 | 1,010 | 772 | 75.67 | 1,625 | 123.2 | 44.5 | 1.12 |
| Brown Trout | ≥200 mm | 5 | 5 | 5 | 5 | 94 | 13.87 | 50 | 38 | 12.38 | 80 | 231.8 | 147.0 | 1.17 |
| Brown Trout | ALL | 97 | 105 | 97 | 115 | 1,981 | 111.73 | 1,050 | 802 | 99.76 | 1,689 | 131.2 | 56.4 | 1.12 |

Attachment provided by GF&P.

# ATTACHMENT 7




Attachment provided by GF&P.

# ATTACHMENT 8

**Data Summary from WQM MN35 – October 1, 2002 to September 30, 2007**

| Parameter | Measured Values | | Water Quality Criteria | | Exceedances/ #Samples | % Exceedance | Support Status |
|---|---|---|---|---|---|---|---|
| | Min | Max | Daily Min | Daily Max | | | |
| Conductivity | 306 | 487 | | 4375 | 0/21 | 0 | Full |
| Dissolved Oxygen | 12.5 | 12.9 | 5.0 | | 0/21 | 0 | Full |
| Fecal coliform | 0 | 20 | | 2000 | 0/11 | 0 | Full |
| Nitrates | 0 | 0.28 | | 88 | 0/21 | 0 | Full |
| pH | 8.3 | 9.0 | 6.5 | 8.8 | 1/20 | 5 | Full |
| Temperature | 1 | 18 | | 23.89 | 0/20 | 0 | Full |
| Alkalinity | 168 | 232 | | 1313 | 0/21 | 0 | Full |
| Ammonia | 0.00 | 0.00 | | | 0/21 | 0 | Full |
| Total Dissolved Solids | 180 | 280 | | 4375 | 0/18 | 0 | Full |
| Total Suspended Solids | 0 | 8 | | 158 | 0/21 | 0 | Full |