

Minnesota
F-29-R(P)-24
Area 315
Study 3
March 2011

**Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries**

Stream Survey Report

Luxemburg Creek

2010

Mark Pelham

Montrose Area Fisheries Office



Funded under Federal Aid by the Sport Fish Restoration Act

Table of Contents

Table of Contents	2
General Information.....	3
Study Area	4
Temperature and Hydrology	4
Luxemburg Creek Electrofishing.....	5
Management Concerns and Recommendations	5
Literature Cited	7

List of Figures

Figure 1. Location and land cover (2001 data) for the Luxemburg Creek watershed.	8
Figure 2. Easement locations on Luxemburg Creek, MN.	9
Figure 3. Hourly temperatures near 230 th St., Luxemburg Creek MN, March-October 2010.....	10
Figure 4. Estimated 2010 hourly discharge for Luxemburg Creek, MN.	10
Figure 5. Location of electrofishing sites on November 2, 2010, Luxemburg Creek, MN.	11
Figure 6. Length (mm) frequency of brown trout captured by electrofishing in easement and reference reaches, Luxemburg Creek, MN, November 2010.	12
Figure 7. Length frequency of brown trout, Luxemburg Creek, MN, Fall 2006-2010. ..	13

List of Tables

Table 1. Temperature statistics for Luxemburg Creek, Spring to Fall 2006-2010.	14
Table 2. Electrofishing results for brown trout, Luxemburg Creek, November 2, 2010..	14

General Information

Stream Name: Luxemburg Creek
Alternate Name: None
Tributary Number: M-073-002
Counties: Stearns
Nearest Town: Luxemburg
Source of flow: Wetland complex west of the town of Luxemburg
Waterway sequence: Wetland /Luxemburg Creek/Johnson Creek (St. Augusta Creek)/ Mississippi River
Stream Length: 6.74 miles from wetland complex to mouth
Gradient: 17-48 ft/ mile
Sinuosity: 1.3-2.2
Classification: Class I-C (Coldwater, brown trout)

Watershed Description

Watershed Name and Number

Major: Mississippi River (17)
Minor: Luxemburg Creek Unnamed
Watershed Area: 7,501 acres
Watershed Land Use: Agricultural 46.3%, Grassland/Pasture 23.6%, Forested 19.2%, Wetland 4.5%, and Developed 4.3% (based on 2001 National Land Cover Database).
Riparian Zone: The surrounding land is primarily residential woodland in the lower portion of the stream. The upper portion of the stream is mostly in agriculture or wetland.

Study Area

Luxemburg Creek is a cold water stream that was designated as a trout stream in 1951. The headwater is located approximately 1.5 miles southwest of the town of Luxemburg in Stearns County, Minnesota. It flows approximately six miles to the confluence with Johnson Creek. Luxemburg Creek has a gradient ranging between 17 and 48 feet per mile and a sinuosity of 1.47. Land use within the watershed (7,501 acres) was estimated to be 46.3% agricultural, 23.6% grassland/pasture, 19.2% forested, 4.5% wetland, and 4.3% developed (based on 2001 National Land Cover Database, Figure 1). A 1400 foot easement (acquired between 1990 and 1992) is located within a residential development known as Cherrywood Estates (Figure 2). Additional easement area was acquired in 2004 between the mouth and the lower end of the original easement area.

An initial survey of Luxemburg Creek was conducted in 1949, which compiled information on fish and invertebrate communities, as well as physical and chemical characteristics. Other surveys were conducted in 1950, 1977, 1980, and 1994. In summer 2001, four bends were stabilized by using root wad revetments to reduce stream velocity and offer overhead cover. Brown trout were last stocked in the 1970s and have become naturalized. Electrofishing has been conducted regularly since 2000 in the initial easement area and in a reference area approximately 0.8 miles upstream.

Temperature and Hydrology

Temperatures were logged hourly from March 24, 2010 to October 28, 2010 for a total of 5,233 readings (Table 1, Figure 3). The maximum temperature recorded was 20.1 °C on July 3 and only four readings were above 20.0 °C. In 2009, the maximum temperature was 19.2 °C, but in previous years, many more temperatures above 20 °C were logged with a maximum of 25.2 °C (Table 1). Temperatures from 2008-2010 have been consistently favorable for brown trout in Luxemburg Creek.

A stage logger has been in place on Luxemburg Creek since October 2002. The logger is located approximately 0.75 miles above the mouth of Luxemburg Creek and records hourly stage readings. The logger was previously located downstream until 2009, when it was moved due to erosion at the site. New rating curves were developed in 2009 and 2010. Data from the

previous site is similar, but caution should be used in any comparisons with data taken after 2008.

The maximum estimated flow in 2010 was 52.8 cfs on June 26 (Figure 4). Base flows were typically 3-4 cubic feet per second during the summer. The effect of several larger rainfalls can be seen in Figure 4, including the period from September to November. Fall precipitation and flows were well above average, possibly affecting brown trout spawning. Brown trout are fall spawners and spawning redds are typically built at low flows in shallow, gravel runs. Possible adverse effects of high flows include: disruption of redd building, higher energetic costs for spawning trout, and sediment deposition over eggs.

Luxemburg Creek Electrofishing

Three stations were sampled by backpack electrofishing on November 2, 2010. Station one covered the area between culverts in the original easement, station two included the rest of the original easement upstream, and station three was at the reference reach located upstream of the 230th Street crossing (Figure 5). This area is private and has limited access. All reaches are wooded with substantial habitat diversity.

Only one adult brown trout was captured in station one and only four young-of-year in station two (Figure 6). Thirteen trout were caught in station three, including seven young-of-year and at least two adult year classes. This was the lowest catch in a survey, dating back to 1993. Electrofishing comparisons have taken place since 2000 between the existing easement area on Luxemburg Creek and the reference reach. The catches of young-of-year and adult trout have been highly variable among years in both reaches (Figure 7; Minnesota Department of Natural Resources 2008).

Management Concerns and Recommendations

Luxemburg Creek is located near the city of St. Augusta, which has experienced rapid development in recent years. A stormwater pond in a new development near the reference reach failed in 2001, causing a large amount of sand and silt to wash into the stream. Most of this has been transported downstream and is currently affecting the easement area. The easement area remains highly impacted; numerous pools have filled with silt or sand, reducing the amount of

available deeper water habitat. Some excess silt remains in the reference reach where the stream has eroded and widened.

The number of adult and young-of-year brown trout has decreased in the easement area since 2006, whereas the reference reach showed a decline in 2002-2004, followed by a recovery (Minnesota Department of Natural Resources 2004, 2009). This roughly corresponds to sediment transport observations since the 2001 siltation event. Suitable spawning substrate was seen during the current survey, but many sites with gravel were covered with sand.

Areas in the easement reach were modified in 2001 to provide deeper water with overhead cover for larger trout. Larger trout were found in these areas and similar natural cover prior to the high sediment load reaching the area. Brush layering techniques have been used in recent years to narrow and deepen the channel in the easement reach and downstream. Some success has been evident where brush has been used and the continued movement of excess sediment downstream should benefit these areas. However, the bulk of the sand and silt load has taken nine years to move less than a mile downstream and it may be several more years before the easement area has been scoured clear.

Natural reproduction seems adequate to ensure a continued brown trout population in Luxemburg Creek, despite the low catch in 2010. Large fluctuations in recruitment have been recorded over many surveys. Both spawning and resting habitat should continue to improve as excess sand and silt continue to be transported further downstream. Brown trout were last stocked in 1979 and no further stocking seems needed at this time.

The chief threat to the stream seems to be further development in the watershed. Increased impervious surface and runoff, siltation, and hydrologic changes from groundwater appropriation pose threats to the stream as development occurs. The current temperature and flow regime are adequate in some years, but marginal in others. Further degradation could jeopardize trout survival.

Trout have been sampled in low numbers in connected streams nearby, such as Robinson Hill (Neenah) Creek and Johnson Creek, but these are presumed to be migrants from Luxemburg Creek. Temperatures in these streams are marginal or unsuitable in some years (Minnesota Department of Natural Resources 2008). Luxemburg Creek could see the same result if further

impacts occur. Watershed and riparian protection should continue to be a priority in managing the stream and habitat improvement efforts should continue where easements exist.

Literature Cited

Minnesota Department of Natural Resources. 2009. Luxemburg Creek Stream Survey Report. Division of Fish and Wildlife, St. Paul, MN.

Minnesota Department of Natural Resources. 2008. Johnson Creek Watershed Stream Survey Report. Division of Fish and Wildlife, St. Paul, MN.

Minnesota Department of Natural Resources. 2004. Luxemburg Creek Habitat Improvement Progress Report. Division of Fish and Wildlife, St. Paul, MN.

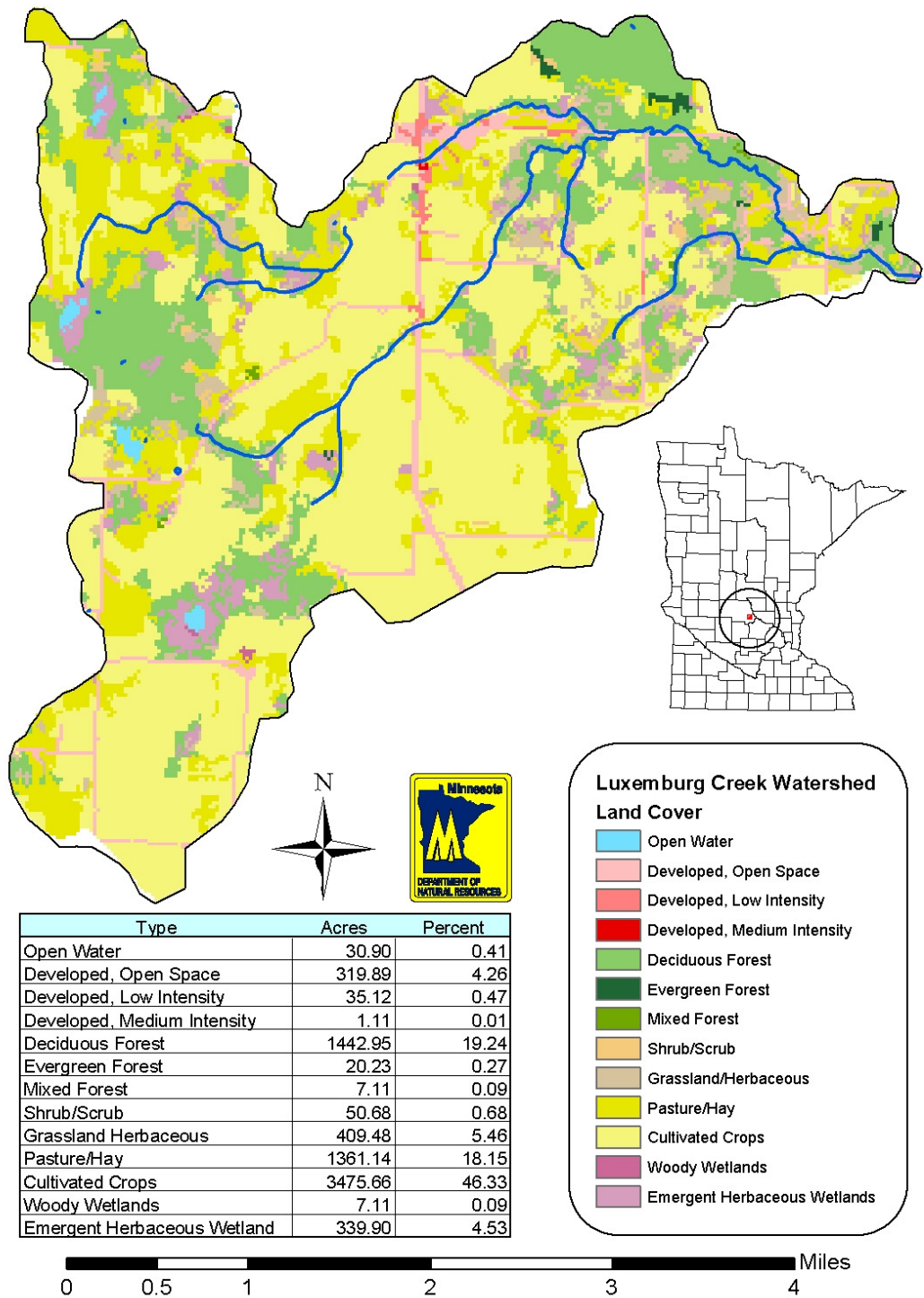


Figure 1. Location and land cover (2001 data) for the Luxemburg Creek watershed.

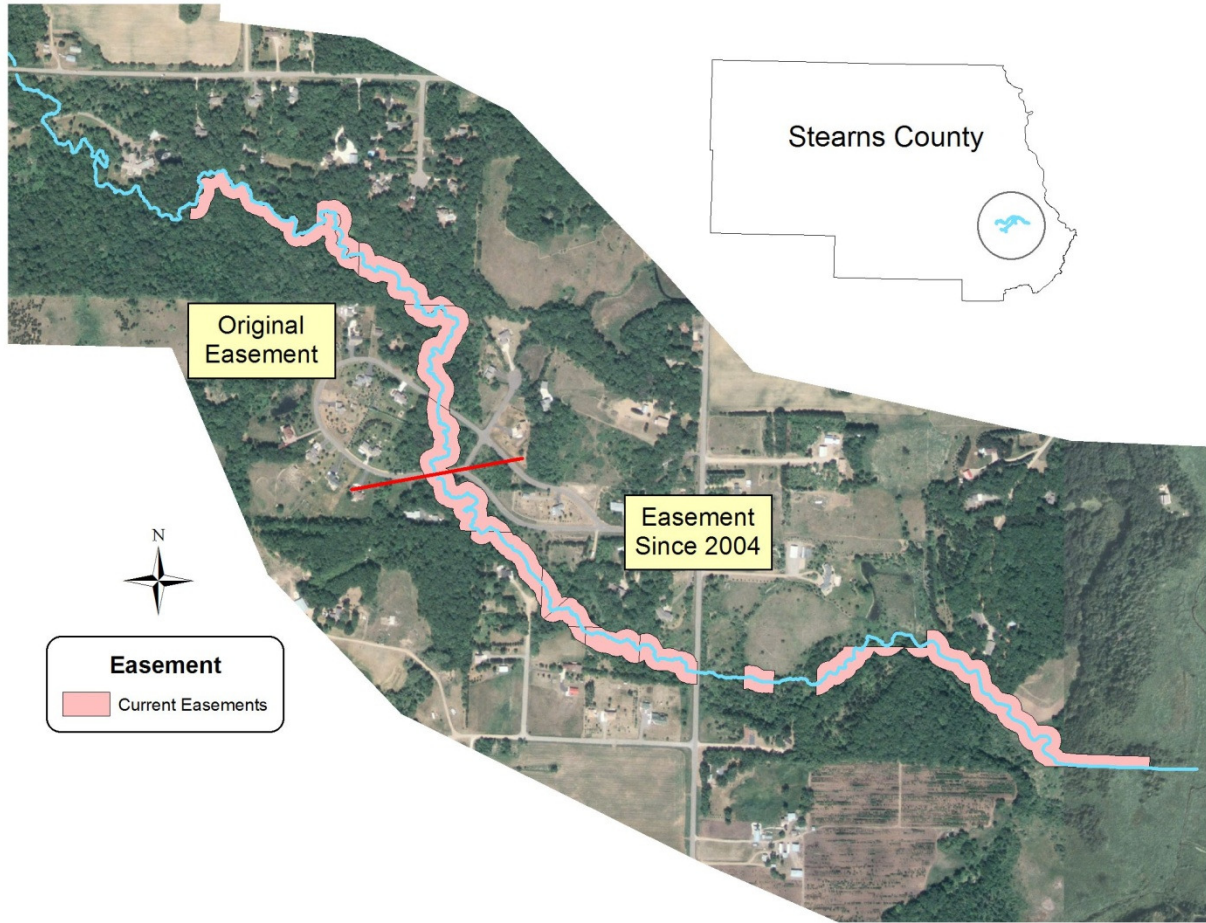


Figure 2. Easement locations on Luxemburg Creek, MN.

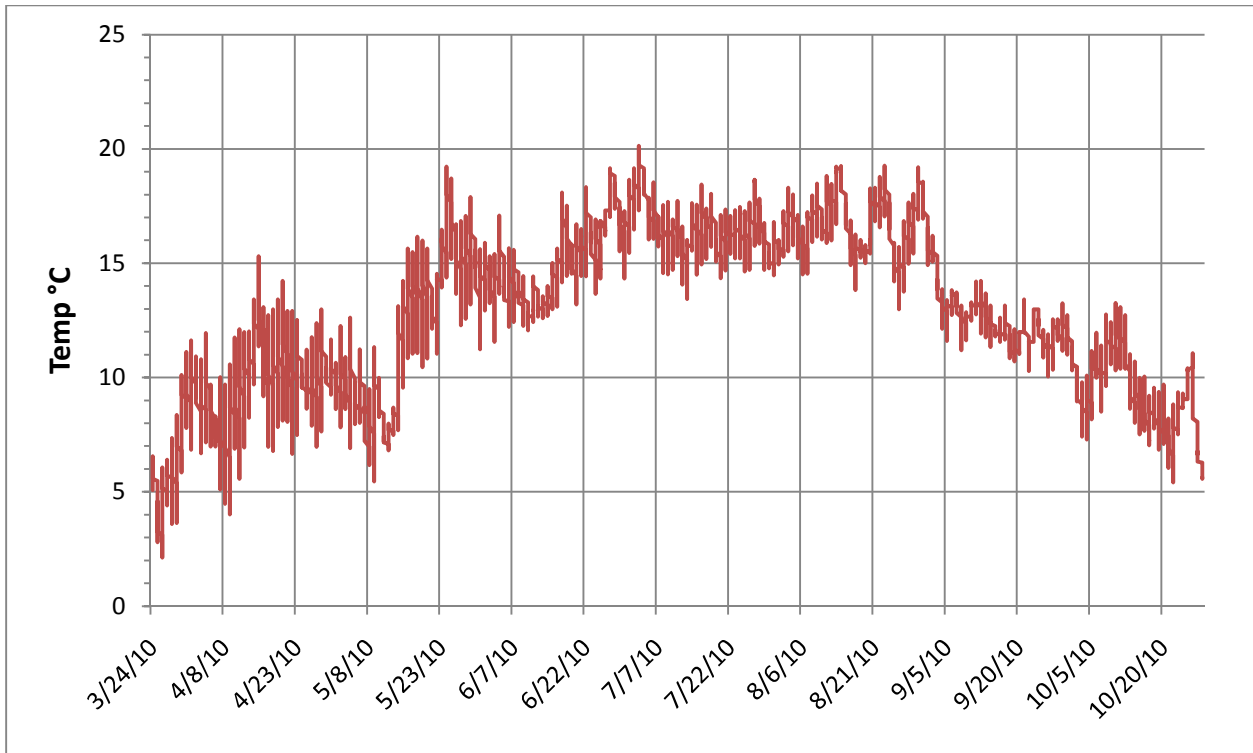


Figure 3. Hourly temperatures near 230th St., Luxemburg Creek MN, March-October 2010.

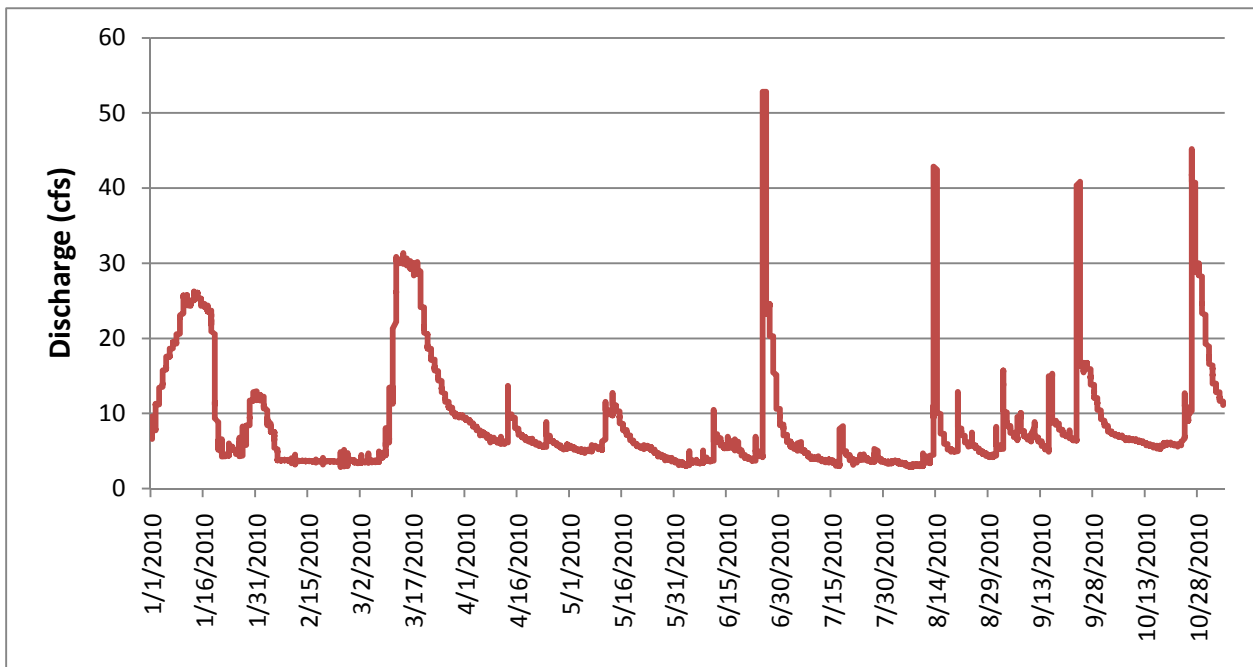


Figure 4. Estimated 2010 hourly discharge for Luxemburg Creek, MN.



Figure 5. Location of electrofishing sites on November 2, 2010, Luxemburg Creek, MN.

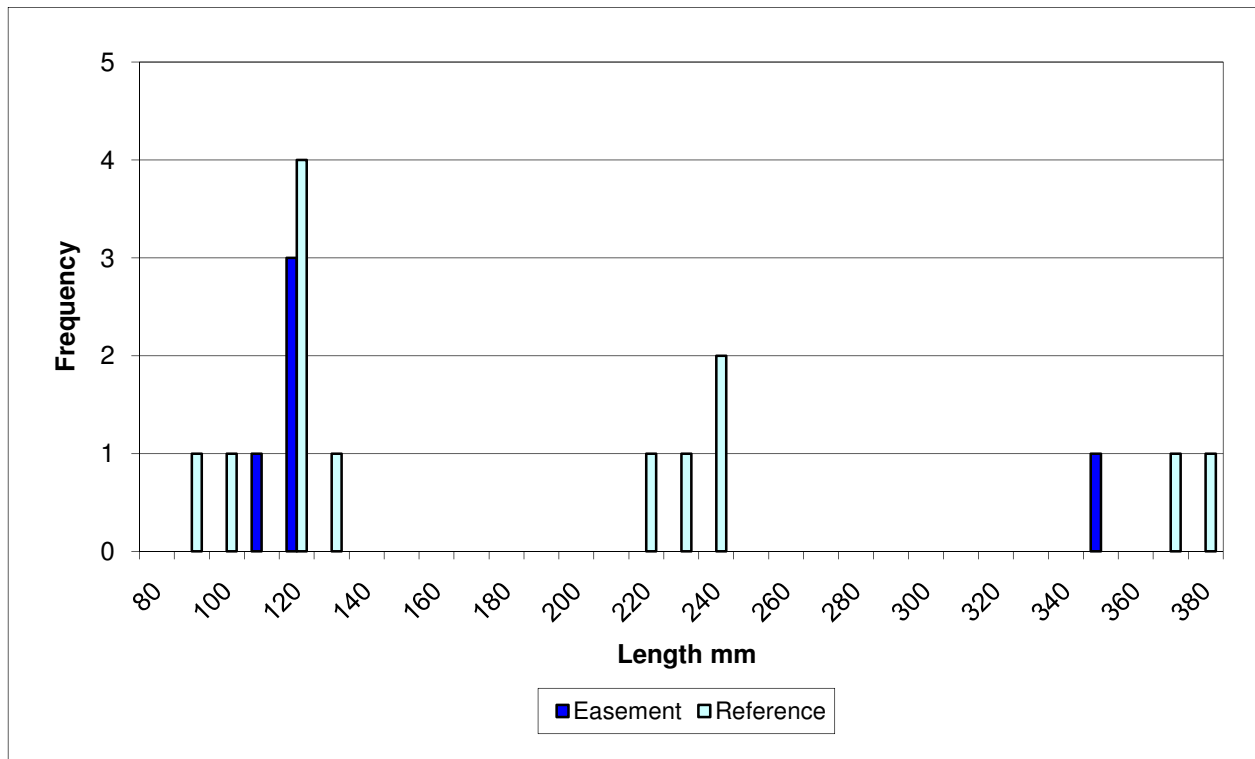


Figure 6. Length (mm) frequency of brown trout captured by electrofishing in easement and reference reaches, Luxemburg Creek, MN, November 2010.

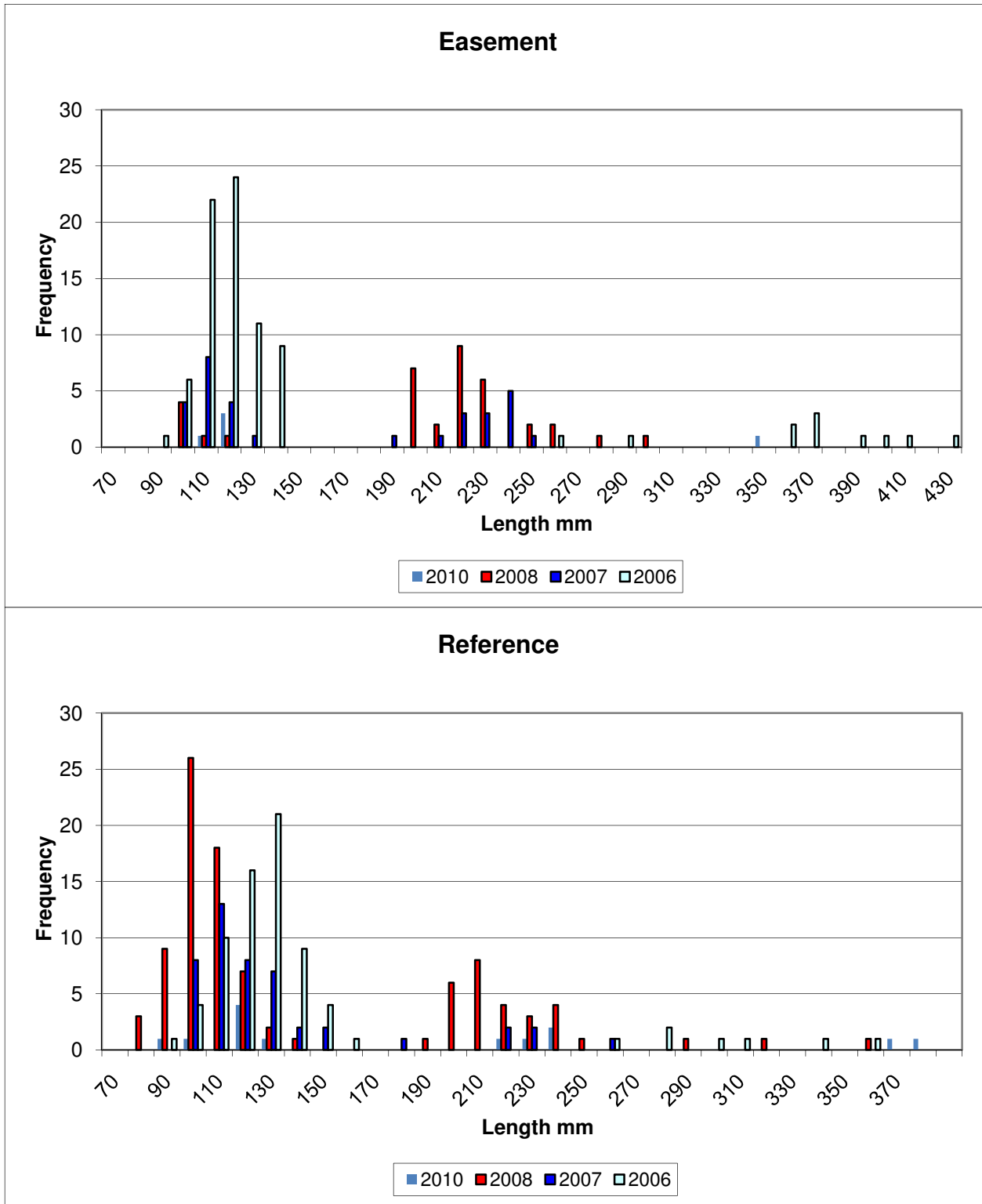


Figure 7. Length frequency of brown trout, Luxemburg Creek, MN, Fall 2006-2010.

Table 1. Temperature statistics for Luxemburg Creek, Spring to Fall 2006-2010.

	2006	2007	2008	2009	2010
Total Readings	4,991	4,229	9,070	4,536	5,233
N hours > 20° C	231	228	0	0	4
N hours > 22° C	47	7	0	0	0
Minimum ° C	5.7	5.1	1.7	3.4	2.1
Average ° C	15.4	15.0	12.8	12.6	12.8
Maximum ° C	25.5	22.2	19.9	19.2	20.1

Note: Readings were taken hourly, except for 2008 when they were taken every 30 minutes.

Table 2. Electrofishing results for brown trout, Luxemburg Creek, November 2, 2010.

Reach:	Reference	Easement	Overall
Total N	13	6	19
CPUE (#/hr)	35.2	5.3	13.7
N >300 mm	2	1	3
Size Range mm	95-385	115-356	95-385
N Age 0	7	4	11
Mean L Age 0 mm	118.3	123.5	120.2

**Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries**

Stream Survey Report

**Luxemburg Creek
2010**



Author

Date



Area Fisheries Supervisor

Date

Regional Fisheries Supervisor

Date

*Copyright 2011. State of Minnesota, Department of Natural Resources.
Reproduction of this material without the express written authorization
of the Department of Natural Resources is prohibited*