Clearwater Resource Council

Adopt-A-Lake Monitoring

**2019 Supplement to the
2014 Progress Report**

Prepared by

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Background

In late summer 2008, the Clearwater Resource Council (CRC) initiated a community-based lake-monitoring program. That work was continued and expanded in subsequent years. Eight lakes have been sampled over the years beginning in May or early June and ending in September or early October, although every lake has not been sampled every year. 2019 was the eleventh full season of sampling. Our primary measurements are Secchi transparency and near surface temperature, and we have used standard methods since the start of the work. The methods used in 2019 were the same as those outlined in previous reports (Rieman et al., 2014).

2018 was a very high-water year with snowpack and flows in the Blackfoot and Clearwater basins near record highs. It also followed the Rice Ridge Fire in 2017 which burned over much of the Morrell-Trail watershed. We saw a substantial increase in nutrient loading in 2018 in all streams influenced by the fire. Other work is focused on nutrient loading to the lakes and streams, but that work was incomplete at the time of this report. The Morrell-Trail watershed contributes nutrients directly to Salmon Lake so that will be a system to watch in the future.

Summary

There were no striking changes or trends apparent with the addition of the data gathered in 2019. To simplify the annual report, we have appended the new data for each lake to the figures and refer readers to Rieman et al. (2014) for a more complete summary of conditions by lake.

In general, there have been consistent differences among lakes and common patterns within lakes across years (Figure 1). Individual lakes show year-to-year variability in means, but there have been no consistent declines or improvements in conditions through the period of monitoring (Figure 2). In 2015 and 2016 most of the lakes (Alva, Inez, Placid, Salmon, Seeley) had mean transparencies that were, or were among the clearest (or deepest) observed across all years (Figures 2 and 9 through 14). In 2018 most lakes (Inez, Placid, Salmon, Seeley and Big Sky) all showed marked reductions in transparencies (more turbid) than several preceding years. In 2019, all of the lakes showed increased transparencies (less turbid) as compared to the previous year. Transparencies probably vary through time in response to differences in stream flow or lake flushing, weather and patterns of warming, and other causes including measurement errors that may change with volunteers. Differences within a lake that persist for four or five years will be important to consider whether fundamental changes in lake trophic conditions are occurring.

In 2017, we discontinued collection of oxygen and temperature values at depth. If long term changes in transparencies do occur in the future additional oxygen data could be useful in confirming changes in lake trophic status.

Acknowledgements

The summer of 2019 was our eleventh full season of data collection. We could not accomplish programs like this without volunteers.

We'd like to express appreciation to our 2019 volunteers:

- Dennis Rolston: Clearwater and Rainy Lakes
- Cathy and Jeff Harrits: Rainy and Big Sky Lakes
- Roger Marshall and Paula Clarke: Lake Alva
- Sylvia and Adam Weisenburger: Lake Inez
- Karen and Ted Linford: Seeley Lake
- Chris and Carol Hunter: Salmon Lake
- Clyde and Sherry Sterling: Placid Lake

Bruce Rieman continues to review the data, provide an experienced second pair of eyes, and contribute to the summary.

McKenzie Schessl, our Big Sky Watershed Corps Member for 2019, ran the Adopt-A-Lake program over the summer.

Finally, Cathy Harrits has been the glue that holds this program together, from updating, assembling and distributing kits at the beginning of the season, to volunteer communications, and the all-important data entry.
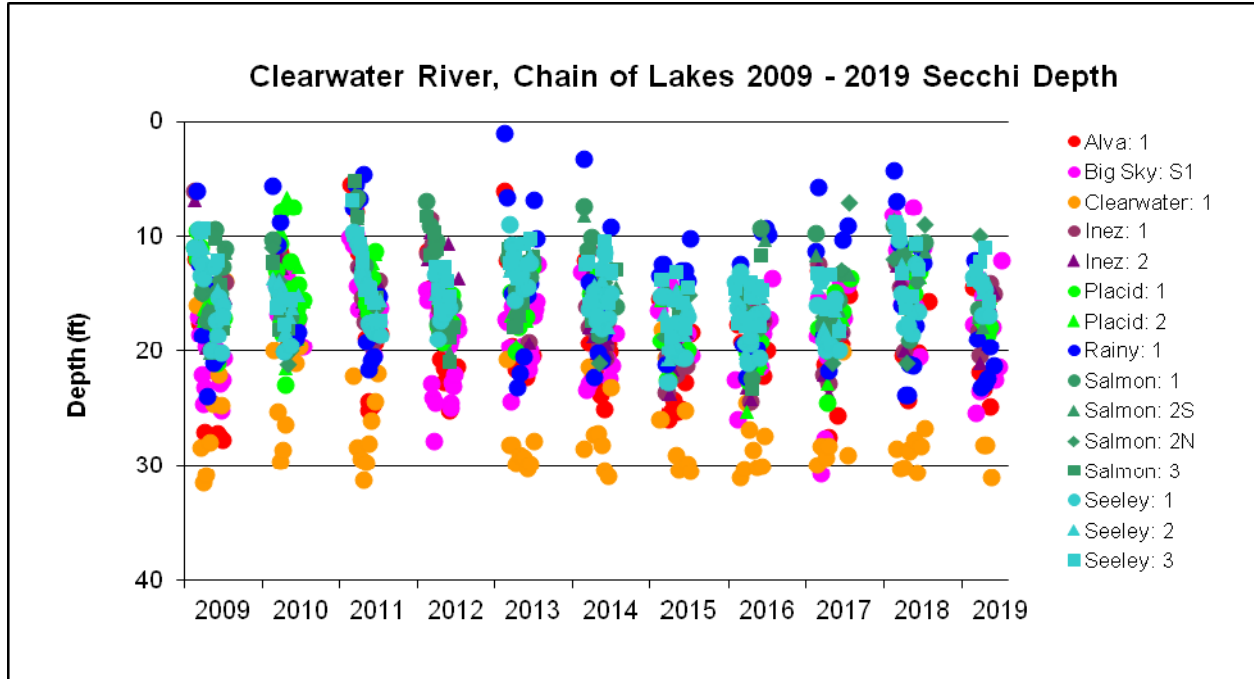
FIGURES

Figure 1. Secchi transparencies (depths) recorded at one or more sites in eight lakes in the Clearwater River Basin, 2009 through 2019. See Rieman et al., 2014 for a map of locations.
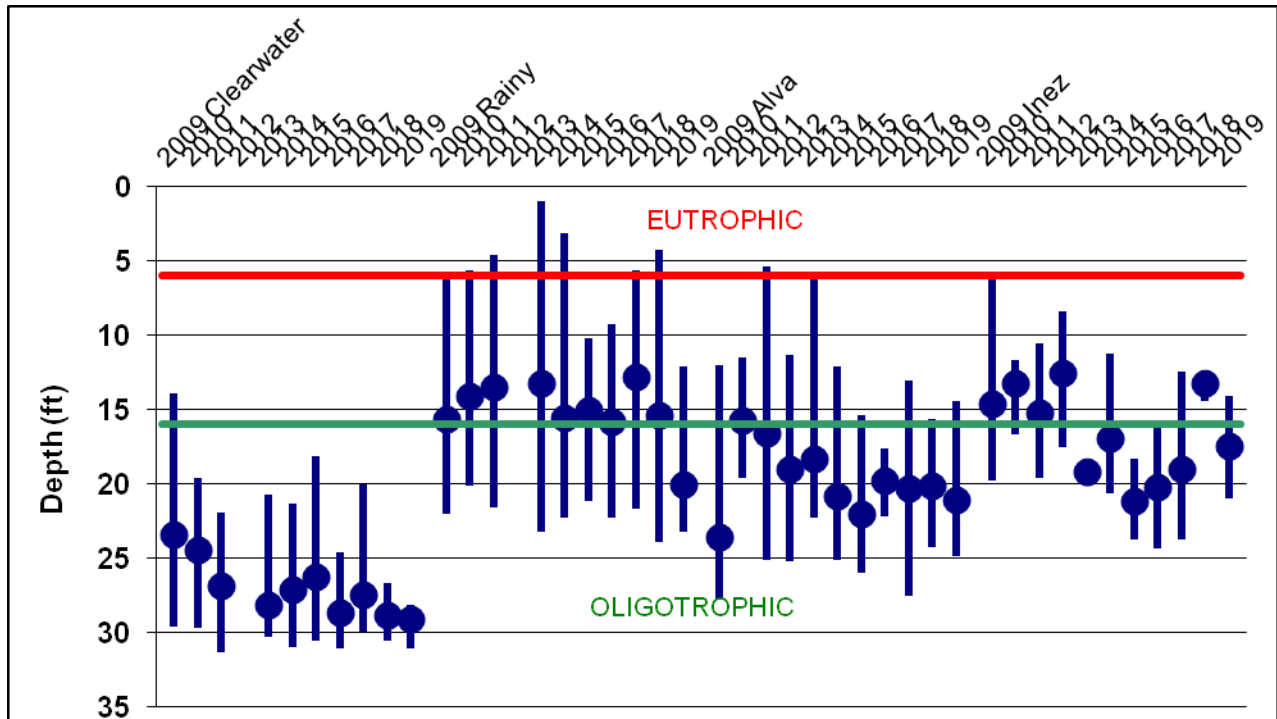
Figure 2a. Mean (solid point) and range (vertical line) of Secchi transparencies recorded in four of eight lakes in the Clearwater River Basin, 2009 through 2019. The red and green lines represent the bounds for transparencies considered indicative of eutrophic and oligotrophic conditions, respectively.
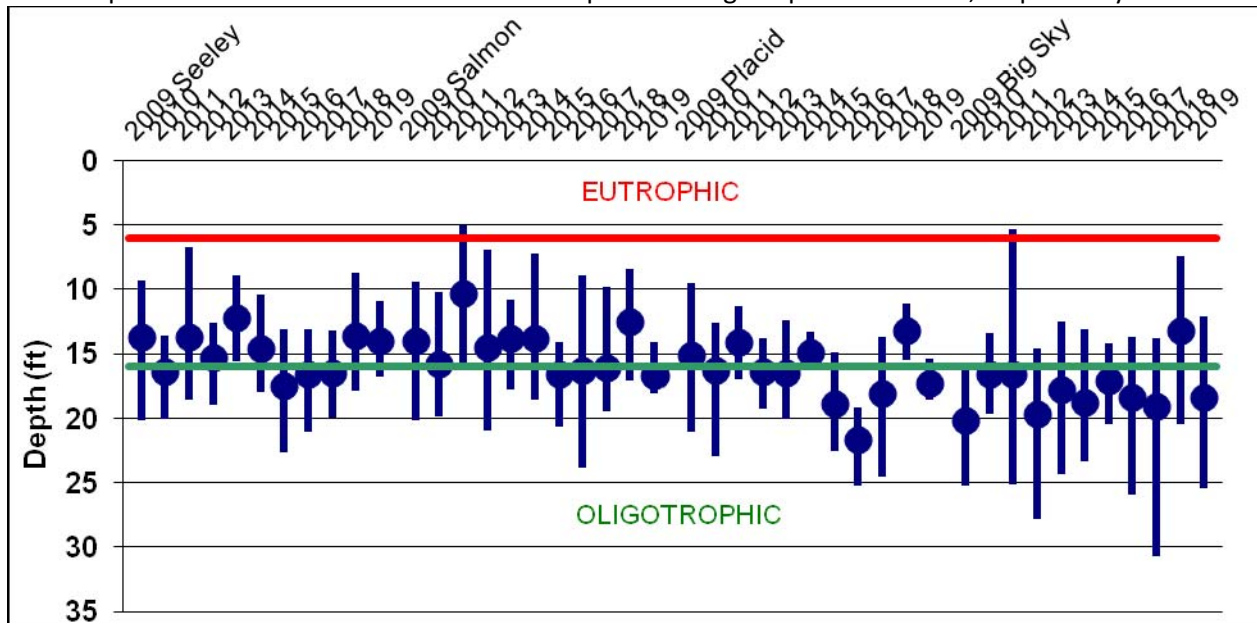

Figure 2b. Continued mean (solid point) and range (vertical line) of Secchi transparencies recorded in four of eight lakes in the Clearwater River Basin, 2009 through 2019. The red and green lines represent the bounds for transparencies considered indicative of eutrophic and oligotrophic conditions, respectively.
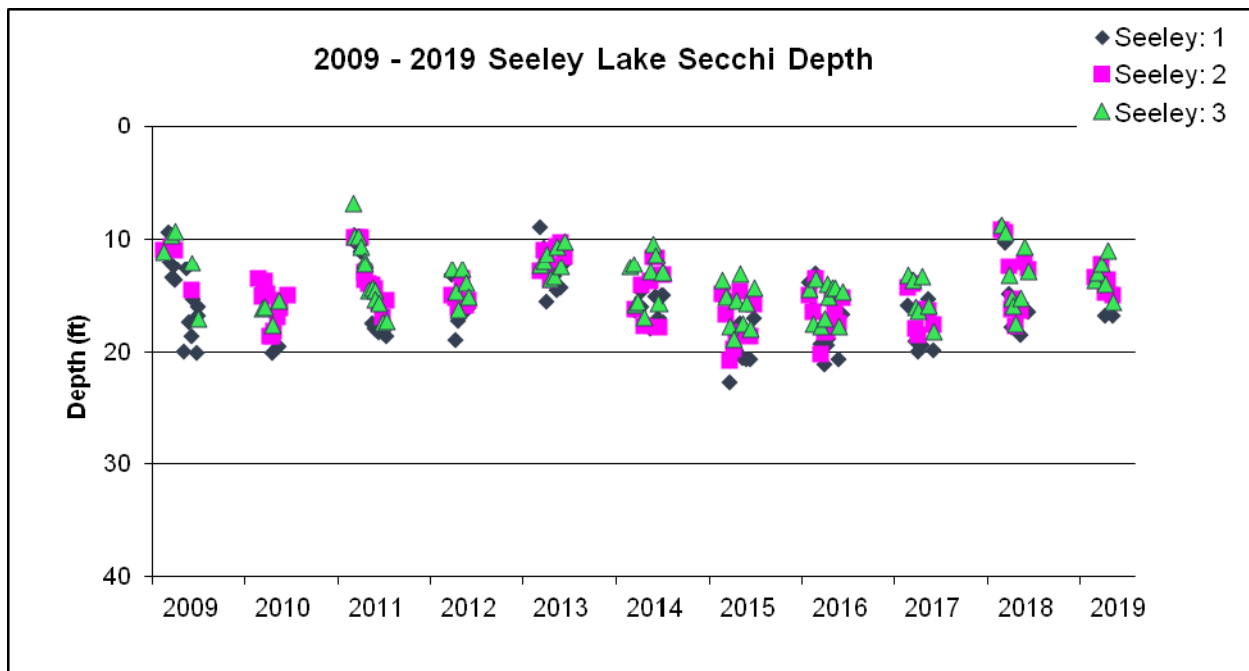
Figure 3. Secchi transparencies (depth) recorded at three sites in Seeley Lake, 2009 through 2019. See Rieman et al., 2014 for a map of locations.

Figure 4. Discontinued.
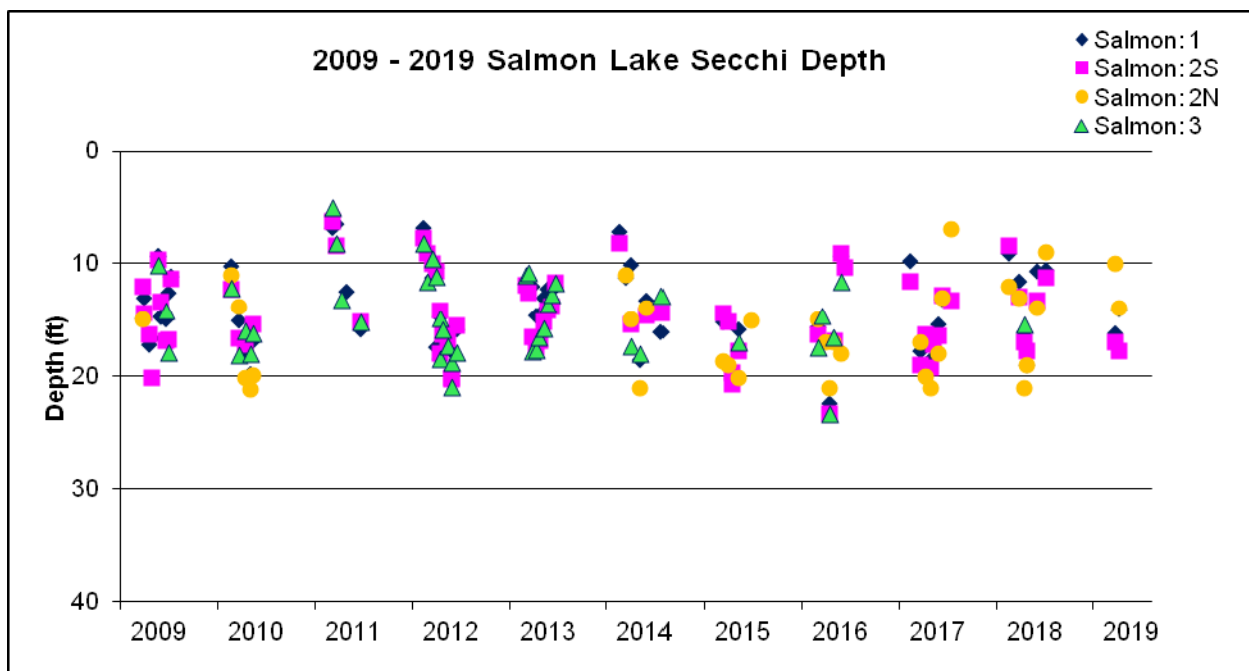
Figure 5. Discontinued.

Figure 6. Secchi transparencies (depth) recorded at four sites in Salmon Lake, 2009 through 2019. See Rieman et al. (2014) for a map of locations.

Figure 7. Discontinued.
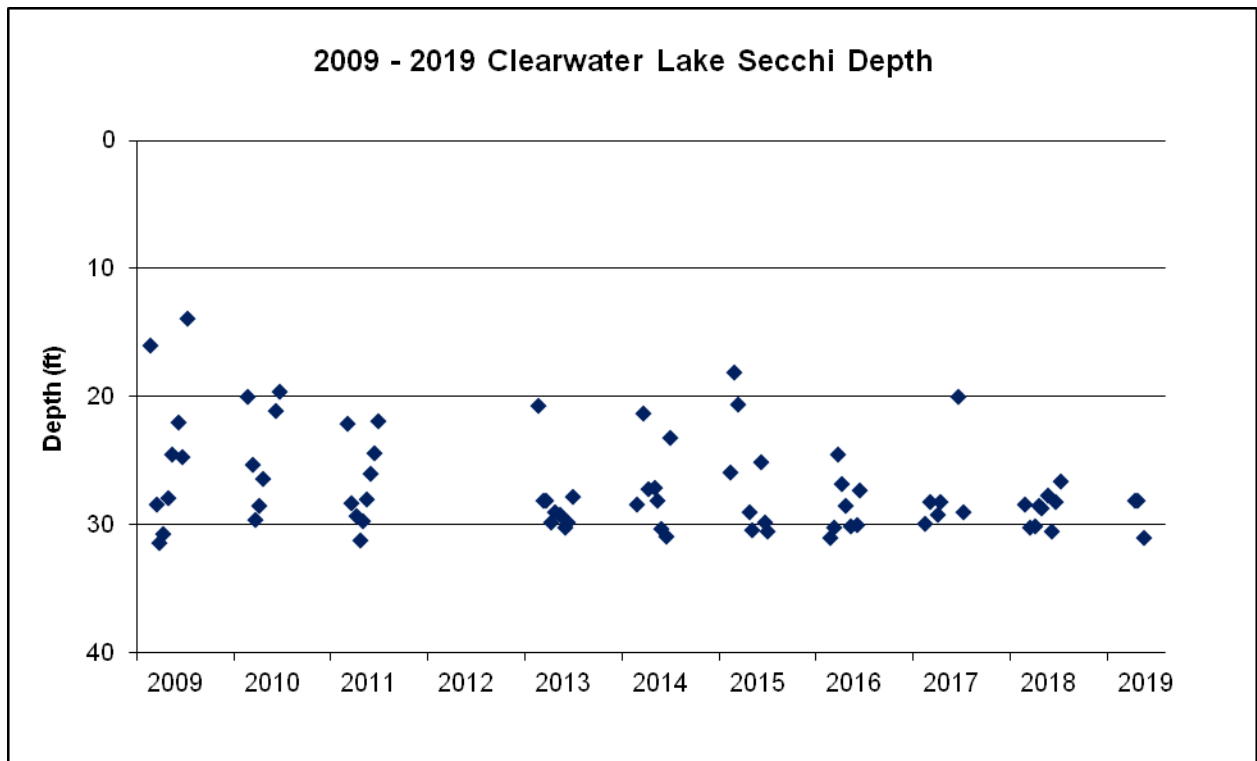

Figure 8. Discontinued.

Figure 9. Secchi transparencies (depth) recorded at a single site in Clearwater Lake, 2009 through 2019. See Rieman et al. (2014) for a map of locations.
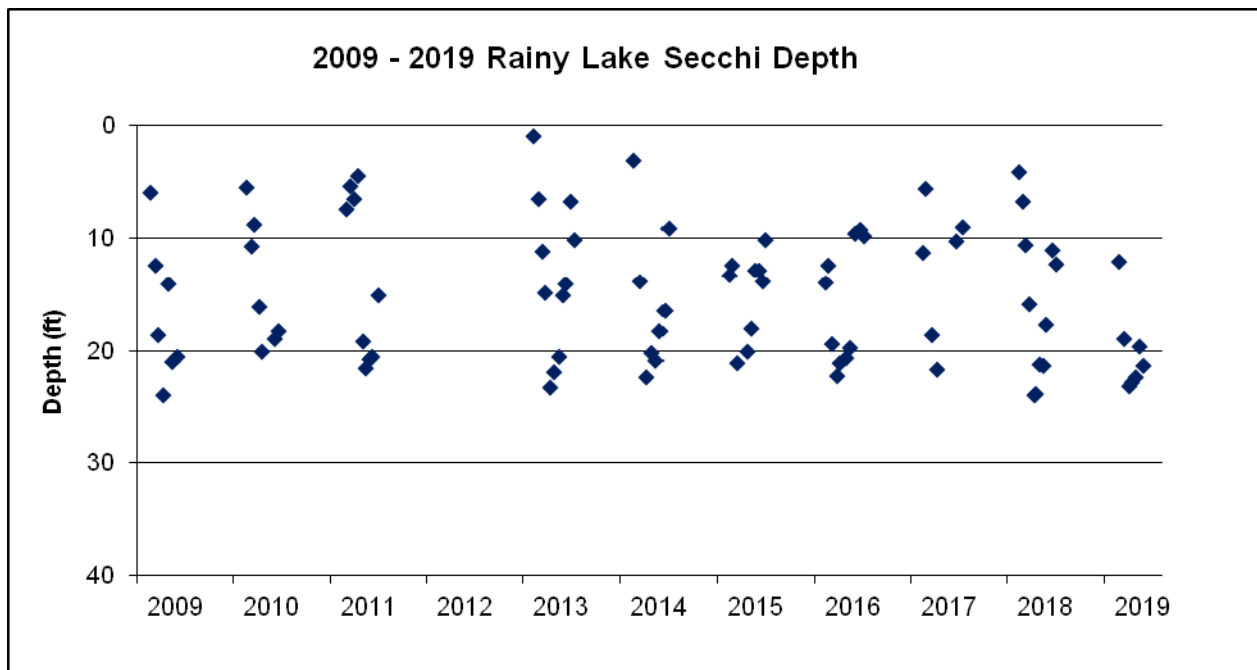

Figure 10. Secchi transparencies (depth) recorded at a single site in Rainy Lake, 2009 through 2019. See Rieman et al. (2014) for a map of locations.
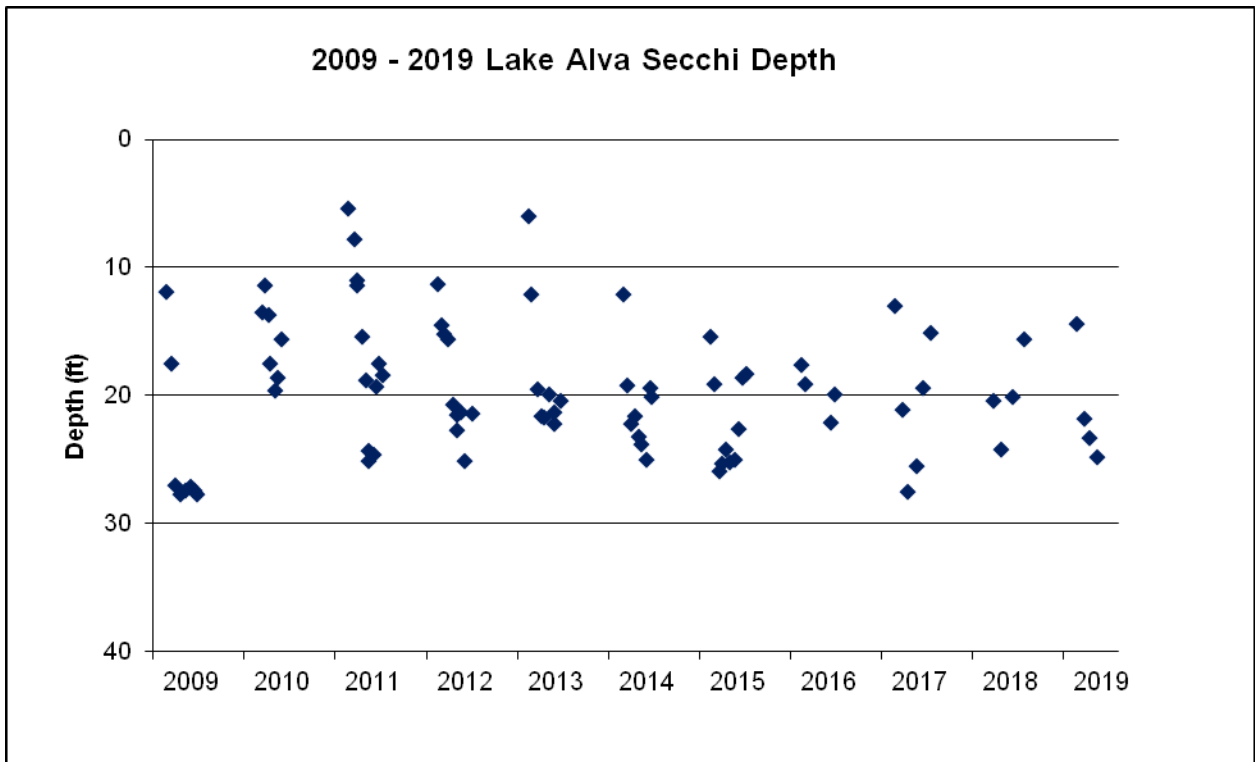
Figure 11. Secchi transparencies (depth) recorded at a single site in Lake Alva, 2009 through 2019. See Rieman et al. (2014) for a map of locations.

Figure 12. Secchi transparencies (depth) recorded at two sites in Lake Inez, 2009 through 2019. See Rieman et al. (2014) for a map of locations.
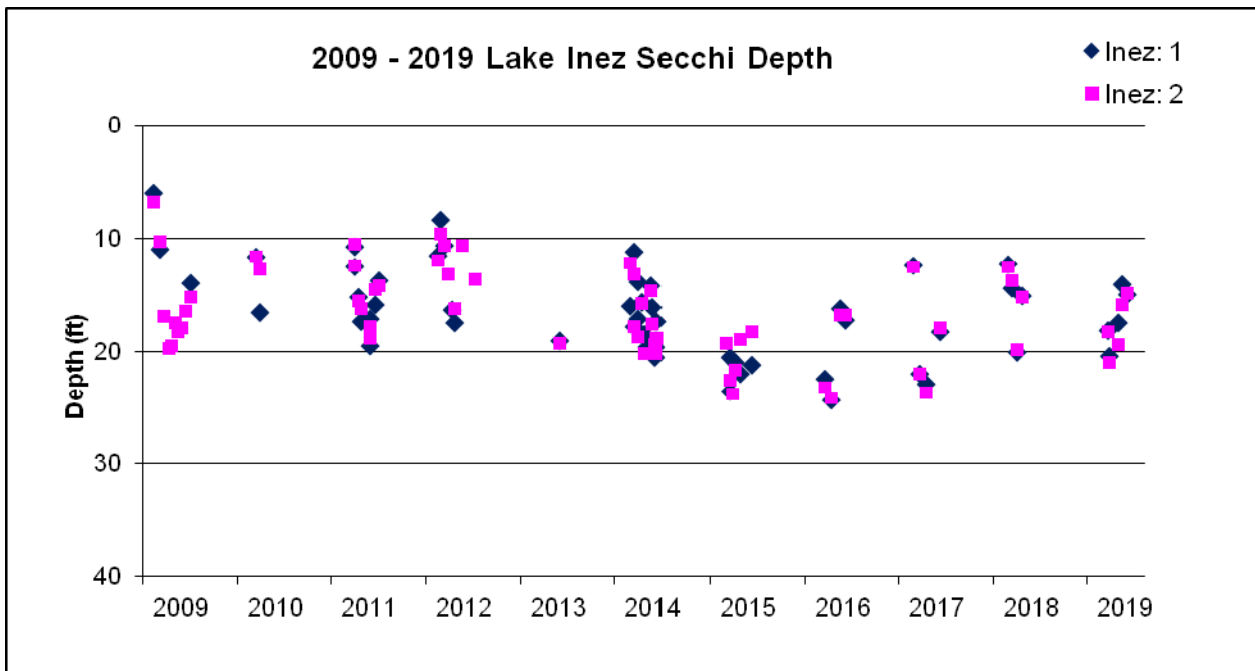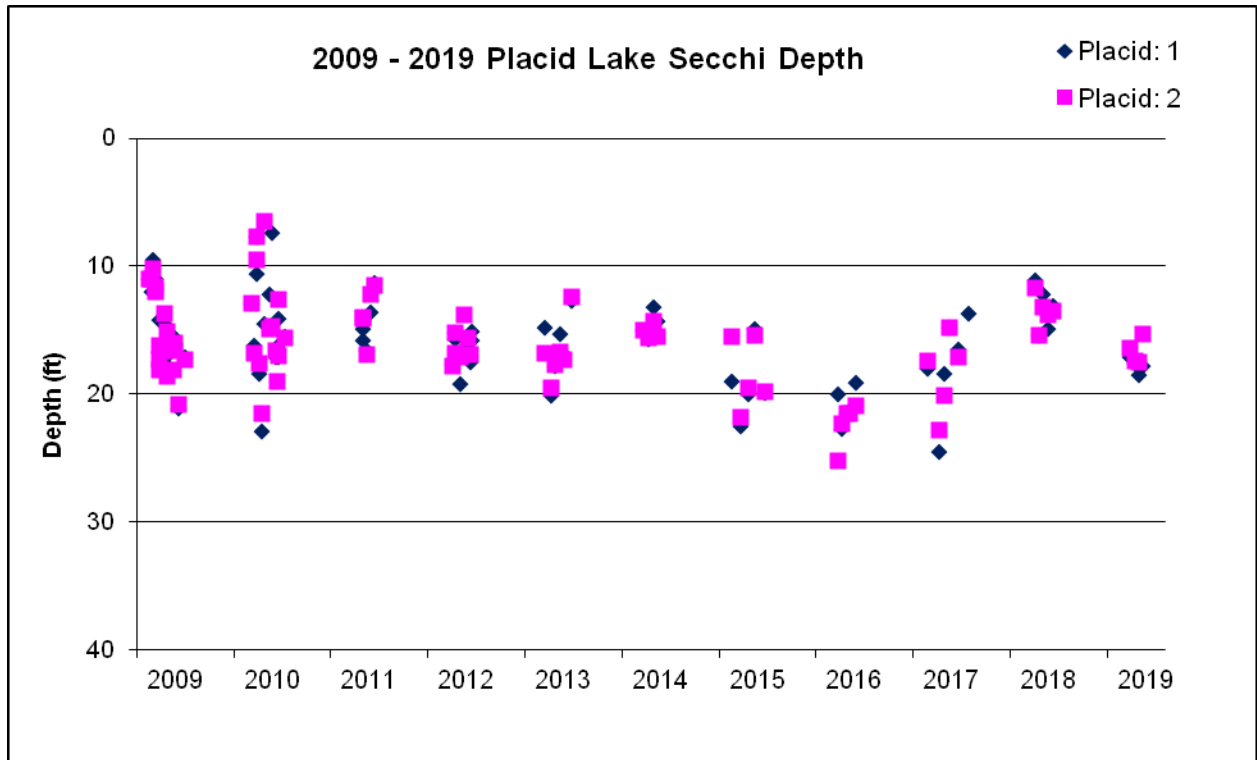
Figure 13. Secchi transparencies (depth) recorded at two sites in Placid Lake, 2009 through 2019. See Rieman et al. (2014) for a map of locations.
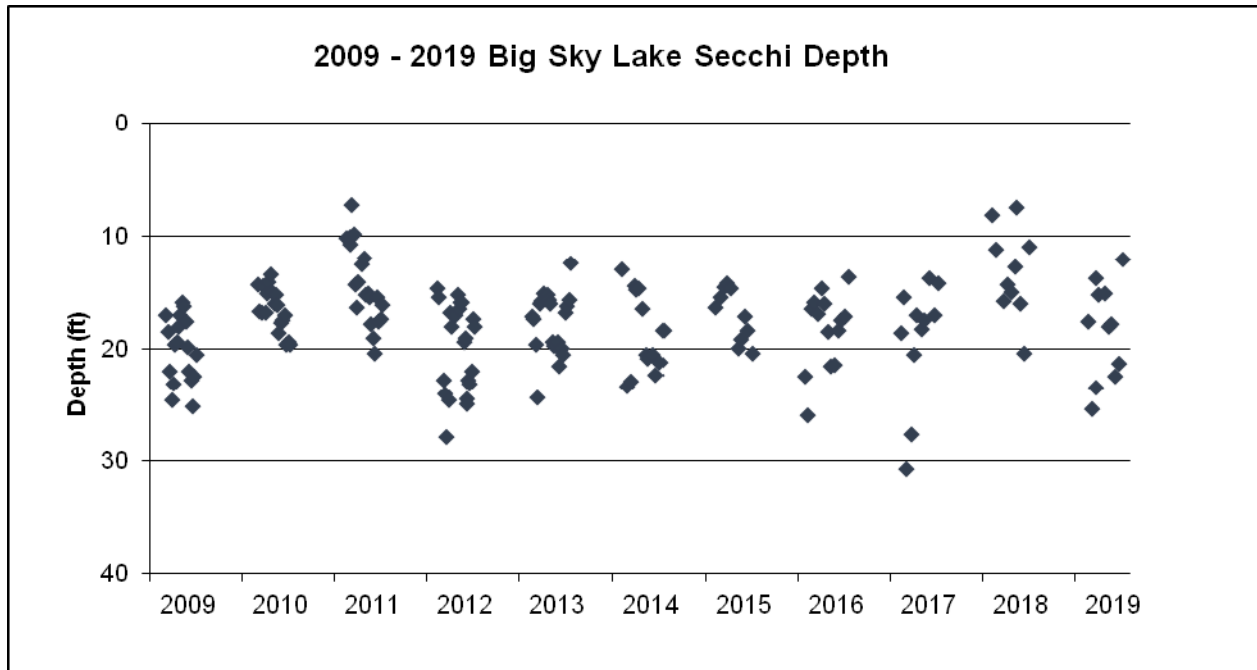

Figure 14. Secchi transparencies (depth) recorded at a single site in Big Sky Lake, 2009 through 2019. See Rieman et al. (2014) for a map of locations.

APPENDIX A: Individual measurements of Secchi transparency (feet) and temperature (°C) collected by volunteers on lakes of the Clearwater Basin in 2019.

Site	Date	Secchi (ft)	Temperature (ºC)
Alva: 1	6/2/2019	14.4	16.0
Alva: 1	6/30/2019	21.8	17.0
Alva: 1	7/21/2019	23.3	21.0
Alva: 1	8/20/2019	24.8	18.0
Big Sky: 1	6/1/2019	17.6	17.0
Big Sky: 1	6/15/2019	25.4	19.0
Big Sky: 1	6/30/2019	23.5	18.0
Big Sky: 1	7/2/2019	13.8	19.0
Big Sky: 1	7/13/2019	15.2	21.0
Big Sky: 1	8/4/2019	15.2	22.0
Big Sky: 1	8/20/2019	18.1	19.0
Big Sky: 1	9/3/2019	17.8	19.0
Big Sky: 1	9/15/2019	22.5	18.0
Big Sky: 1	10/1/2019	21.3	12.0
Big Sky: 1	10/16/2019	12.1	9.0
Clearwater: 1	7/21/2019	28.1	19.0
Clearwater: 1	7/31/2019	28.1	19.0
Clearwater: 1	8/28/2019	31.0	20.0
Inez: 1	6/26/2019	18.1	17.0
Inez: 1	7/3/2019	20.4	18.0
Inez: 1	8/5/2019	17.5	22.0
Inez: 1	8/19/2019	14.1	22.0
Inez: 1	9/9/2019	15.0	18.0
Inez: 2	6/26/2019	18.3	16.0
Inez: 2	7/3/2019	21.0	20.0
Inez: 2	8/5/2019	19.4	22.0
Inez: 2	8/19/2019	15.9	22.0
Inez: 2	9/9/2019	14.9	18.0
Placid: 1	7/6/2019	17.2	15.0
Placid: 1	7/25/2019	17.6	15.0
Placid: 1	8/8/2019	18.5	22.0
Placid: 1	8/21/2019	17.8	20.0
Placid: 2	7/6/2019	16.4	15.0
Placid: 2	7/25/2019	17.5	15.0
Placid: 2	8/8/2019	17.5	22.0
Placid: 2	8/21/2019	15.3	20.0
Rainy: 1	6/7/2019	12.1	11.0
Rainy: 1	6/22/2019	18.9	14.0
Rainy: 1	7/11/2019	23.2	18.0
Rainy: 1	7/25/2019	22.8	19.0
Rainy: 1	8/8/2019	22.3	18.0
Rainy: 1	8/22/2019	19.6	10.0
Rainy: 1	9/4/2019	21.3	20.0
Salmon: 1	6/29/2019	16.3	10.0
Salmon: 1	7/14/2019	14.1	14.0
Salmon: 2	6/29/2019	17.0	10.0

Appendix A *continued*			
Site	Date	Secchi (ft)	Temperature (ºC)
Salmon: 2	7/14/2019	17.8	14.0
Salmon: 4	6/30/2019	16.6	10.0
Salmon: 4	7/14/2019	18.1	14.0
Seeley: 1	6/4/2019	13.5	17.5
Seeley: 1	6/16/2019	13.5	18.0
Seeley: 1	7/2/2019	14.0	17.0
Seeley: 1	7/15/2019	16.8	21.0
Seeley: 1	7/27/2019	14.6	20.0
Seeley: 1	8/15/2019	16.8	20.0
Seeley: 2	6/4/2019	13.4	17.0
Seeley: 2	6/16/2019	13.6	19.0
Seeley: 2	7/2/2019	12.2	17.5
Seeley: 2	7/15/2019	14.8	22.0
Seeley: 2	7/27/2019	13.7	20.0
Seeley: 2	8/15/2019	15.0	20.0
Seeley: 3	6/4/2019	13.7	17.0
Seeley: 3	6/16/2019	13.0	20.0
Seeley: 3	7/2/2019	12.2	18.0
Seeley: 3	7/15/2019	14.0	21.0
Seeley: 3	7/27/2019	10.9	20.0
Seeley: 3	8/15/2019	15.6	21.0