



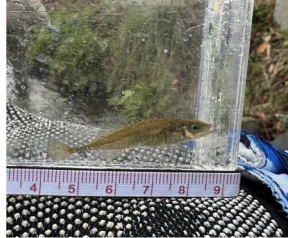
HOW TO CONSERVE *KAKURE-TOMIYO*

山形県立東桜学館高校 2年
「SS総合探求Ⅱ(総合的な探究の時間)」

ABSTRACT: *Kakure-tomiyo* is a natural treasure in Higashine City which is listed as a category 1a endangered species. Recently, the population size of *kakure-tomiyo* gradually decreases. We participated the population size survey which was held in Higashine and learned the issue of the ongoing survey. We suggest how to improve the population size survey and protect them.

1. RESEARCH BACKGROUND AND PURPOSE

Kakure-tomiyo is a recently acknowledged species of the nine-spined sticklebacks. They are called *pungitius-modestus* academically. They live in streams and small river near our school. These freshwater fish measuring 5 cm in length, can survive in cold water below 15 degree centigrade, such as spring and slow-flowing streams. Interestingly, male of *kakure-tomiyo* build nests to attract females for egg-laying. After the eggs are laid, the male takes full responsibility for them until they hatch. Their one-year lifespan makes conservation efforts even more critical. However, they are faced the threat of extinction. Also, the member of Kakure-tomiyo Conservation Society are aging. Concerned about this, we have conducted research on ways to conserve them.



2. RESEARCH METHOD

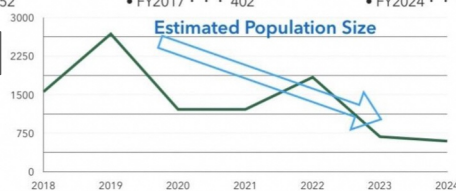
Participation in the population survey, which held in Omi River, Higashine City in December for 2 days. We set traps to catch *kakure-tomiyo*, and counted the number of it in them.



3. RESULTS AND CONSIDERATION

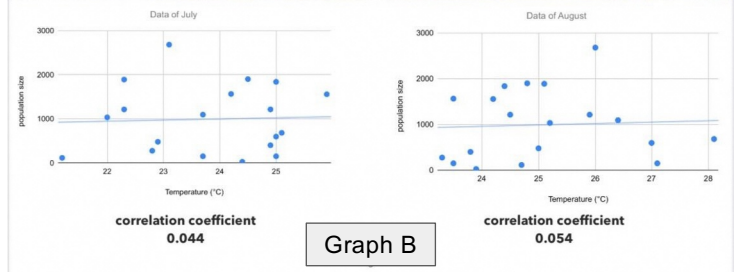
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|----------------------|------------------------------------|----------------------|
| • FY2004 . . . 1,566 | • FY2011 . . . 1,902 | • FY2018 . . . 1,558 |
| • FY2005 . . . 1,892 | • FY2012 . . . 1,096 | • FY2019 . . . 2,683 |
| • FY2006 . . . 1,035 | • FY2013 . . . Unable to calculate | • FY2020 . . . 1,215 |
| • FY2007 . . . 116 | • FY2014 . . . Unable to calculate | • FY2021 . . . 1,215 |
| • FY2008 . . . 152 | • FY2015 . . . 27 | • FY2022 . . . 1,840 |
| • FY2009 . . . 277 | • FY2016 . . . 480 | • FY2023 . . . 683 |
| • FY2010 . . . 152 | • FY2017 . . . 402 | • FY2024 . . . 598 |

Graph A



Graph A illustrates the changes in the *kakure-tomiyo* population size in Higashine. Annual surveys are conducted to monitor the number. Conservation activities include managing water plants, removing terrestrial plants that invade streams and maintaining conservation ponds exclusively for native species. Protective measures such as bird nets and gill nets, have also implemented.

CORRELATION BETWEEN THE POPULATION OF *KAKURE-TOMIYO* AND THE TEMPERATURE IN HIGASHINE CITY



Graph B shows the relationship between water temperature and population size. As the graph shows, no significant correlation has been found. In Omi River, the water temperature remains around 13°C year-round because of the spring water, providing a stable environment for *kakure-tomiyo* to survive.

HOW TO CONSERVE THEM FROM NOW?

1. Change the means of population survey
2. Conducting detailed ecological surveys using underwater cameras
3. Study of the impact of the runway extension project
4. Strict management of spring water sources [in order to preserve springs]
 - a) Implementation of tree planting
 - b) Establishment of artificial irrigation facilities
5. Public relations activities to make people aware of *kakure-tomiyo*

4. FUTURE PROSPECT

• Our mission is to protect this natural treasure and maintain the pristine water quality. The success of conservation of *kakure-tomiyo* means we have great richness of nature.
• We hope to investigate whether these methods we propose are actually effective in the conservation of our *kakure-tomiyo*.

5. Acknowledgement

We would like to thank Prof. Hanzawa Naoto for great advice. We are also grateful to Higashine City hall for their cooperation.

(REFERENCES)

- Mori, Seiichi. (1999). Tansui seibutsu no hozon seitaigaku [Conservation ecology of freshwater organisms]. Shinzansha Scitech.
- Mori, Seiichi. (2002). Kankyo hozon gaku no jissen to riron -2- [Theory and Practice of Environmental Conservation Studies 2]. Shinzansha Scitech.
- Graph A: Higashine City "Kakure Tomiyo Habitat" Conservation Liaison Council FY 2024 Population Estimation Survey Results Report (Council Distribution Material)
- Graph B: Japan Meteorological Agency "Past Weather Data", https://www.data.jma.go.jp/obd/stats/etrn/view/nml_amd_d.php?prec_no=35&block_no=1488&year=&month=8&day=&view=p1