From: Bobrowski, Russell FLNR:EX <Russell.Bobrowski@gov.bc.ca>
Sent: April 15, 2020 2:25 PM
To: cityhall@quesnel.ca; John MacLean <jmaclean@cariboord.ca>
Subject: Dragon Lake Goldfish Control Oppurtunity

?Dear Representative of the Cariboo Regional District and City of Quesnel,

As I am sure you are aware, goldfish have been illegally introduced into Dragon Lake pose a considerable threat to the recreational fishery which generates approximately $1,000,000 in annual economic expenditures.

We have secured $15,000 from the Freshwater Fisheries Society of British Columbia (FFSBC) for the next three years to in hopes to reduce goldfish numbers in Dragon Lake and protect the valuable recreational fishery it supports.

For the project to be implemented, another $10,000/year is required. Ministry funds were intended to be contributed, however, funding cut-backs have forced us to look elsewhere.

I am asking if it is possible for the City of Quesnel and/or the Cariboo Regional District to contribute the necessary funds to implement the project.

Please get back to me if your organization is able to contribute financially to this project.

I have attached a project proposal with more details.

Please feel free to call and discuss if you have any questions including the prior work that has gone into this project, time sensitivities, and significance of the Dragon Lake fishery.

Best Regards,

Russell Bobrowski

Fisheries Biologist

Cariboo Region

Ministry of Forests, Lands, Natural Resource Operations, and Rural Development

FFSBC Provincial Technical Committees Fund
Proposal Submission Form
2020-2021

*Submit completed proposal electronically to Sue.pollard@gofishbc.com by **4:30 pm, Friday, December 14, 2019.** Please use Arial/Times Roman font 10 or larger. Submit as a Word doc, not PDF.*

Technical Committee to which this project applies (choose ONE):

☒ **Small Lakes** ☐ **Large Lakes** ☐ **Rivers** ☐ **all**

Project Title: Dragon Lake Goldfish Control and Assessment
Project Lead: Russell Bobrowski
Administrative Region/Branch: Cariboo
2019-2020 Budget Request: $25,000
Regional/ Branch Financial Officer: Dee Thomas

SECTION 1 – PROJECT TYPE

☒ **New Project** proposed for 4 years **OR**

☐ **Continuing Project** in year Click to enter text of Click to enter text year(s)

Tracking # (for continuing projects): Click to enter text

Will this project proceed if funding is reduced? No

Could this project be deferred to a future year? No

Project Category *(choose all that apply)*:

☐ Angler Effort, Catch & Satisfaction*	☐ Management Plans
☐ Data Standards and Management*	☒ Aquatic Invasive Species
☐ Research and Development*	☐ Angler Access and Infrastructure
☐ Stock Assessment*	☐ Compliance and Outreach
☐ Habitat Maintenance, Restoration & Enhancement	☐ Stock Recovery & Enhancement
	☐ Other: explain

If your proposal involves developing a numerical estimate* (for abundance, harvest, effort, etc.), have you consulted with a Quantitative Biologist[1] to confirm methodology is sound? no

Project Location(s) and Species:

Please provide location information below for any waterbody-specific projects.

Region	Lake/River Name	Waterbody ID	Target Species
Cariboo	Dragon	00067QUES	Goldfish

SECTION 2 – PROJECT INFORMATION

1. **Describe the management issue to be addressed and, where appropriate, what specific management action(s) will be considered for implementation based on the outcomes of this project. (*1/2 page maximum*):**

Dragon Lake is highly productive and supported only rainbow trout up until the recent past. Goldfish were illegally introduced in 2009 and now present a threat to the sport fishery and hatchery operations. Preliminary investigations in 2019 suggest the lake supports thousands of mature goldfish (up to 30 cm in length) and their diet overlaps significantly with rainbow trout. Risk assessments have been initiated and although then likelihood of substantial impacts to the rainbow trout population are uncertain, there remains possibility that this valuable fish population could be significantly impacted.

The current manage approach uses information from RISC gillnetting (most recently done in 2017, and scheduled for 2020), annual biological data updates from hatchery operations (mature rainbow trout growth, size at maturity and abundance), and angler reports to monitor potential impacts to the rainbow trout population. Detailed assessment of the goldfish population has not occurred to date. The aforementioned information sources suggest the rainbow trout population in Dragon Lake remained relatively stable and healthy up until spring 2018 when the fishery declined dramatically, resulting in many complaints to Regional and Provincial fishery managers. Although the fishery did show signs of improvement in fall 2018, concerns over goldfish impacts remain and stakeholders are requesting action to control goldfish numbers. Assessing the goldfish population directly in Dragon Lake has not been conducted prior to 2019 and does not seem cost-effective for government staff unless partnership funds are acquired.

[1] If you are not sure who they are please ask Committee Co-Chairs or Coordinator

This project was proposed for funding from the Small lakes Committee last year (2019/2020), but was unsuccessful, primarily due to low scores for technical feasibility. In response to this feedback, Ministry funds were used to hire the contractor for one day of boat electrofishing in July 2019 to better assess feasibility. The majority of the lakeshore was travelled that day and 2 sites were found with high numbers of goldfish. The method was effective at capturing large goldfish (15-40 cm FL) although catchability decreased dramatically when the fish moved into deeper water (>12-16 feet). In total, approximately 500 large goldfish were captured that day but likely represents less than 5% of the total population in that size range. Fish would need to be concentrated in shallow water for the method to be truly effective at significantly reducing the population in the long-term. Through stakeholder consultation, we have been advised with high certainty that goldfish become concentrated in less than 10 feet of water for some time each spring. Given this information, the proposed study looks to apply 2-3 days of high effort electrofishing for 2-3 periods (a one week rest period to increase catchability again) in the spring when goldfish are present.

2. Identify the <u>project objectives</u> (*bullet form*):

1. Evaluate the feasibility of using boat electrofishing to control goldfish numbers in Dragon Lake in the long term (10+ years). This methodology has proven effective on Paul Lake (Thompson Region, BC), and a preliminary investigations in 2019 provide optimism for Dragon Lake. The final product of this project would be 10+ year plan for controlling goldfish in Dragon Lake using boat electrofishing. It is anticipated that the methodology will be successful at substantially reducing the goldfish population in the short term, but annual costs maybe $10-20,000 annually on a fairly regularly basis (every 2-3 years). It does not seem appropriate for the Small Lakes Committee to fund annual control costs, but rather another funding agency (City of Quesnel, FLNRORD, ect) or partnership will be pursued for regular control costs after this initial feasibility study.

2. The second objective is to collect information on the abundance, mortality, and population structure (size, sex, maturity, fecundity) of Goldfish in Dragon Lake to better evaluate their risk to rainbow trout populations.

Specific objectives:

- Conduct 2-3 periods of high effort (2-3 of 10-14 hour days) boat electrofishing in the spring of 2020-2023 to capture as many goldfish as possible. This methodology has proven effective on Paul Lake (Thompson Region) and preliminary investigations in 2019 suggest it can be effective on Dragon Lake.

- Estimate the number of goldfish captured at each site on each day. Use depletion methodology (within year and between year) to estimate population size. Possibly use seining and mark-recapture to evaluate the portion of the population vulnerable to boat electrofishing
- Sample a portion of the catch to evaluate size, age, and maturity schedules.
- Repeat procedure over 4 successive years in hopes of reducing the spawning stock by at least 75%. In Paul Lake, 94% of the redside shiner population was removed over three years
- Produce report describing plan to maintain low goldfish densities in Dragon Lake (In Paul lake it is boat electrofishing once every 4 years after the initial years of large depletions of the spawning stock)

3. **Identify <u>project deliverables</u> (*bullet form*):**

- Produce report (after year 4) describing a 15 year plan to maintain low goldfish densities in Dragon Lake.

4. **Describe the <u>significance of the fishery</u> associated with the project in terms of the type(s) of opportunity it provides. Please include a metric to assist in evaluation such as its performance (e.g. effort) and/or uniqueness in the region (i.e. are there other similar types of fisheries offered within a day's drive, numbers of lakes where a developed app can be applied to inform management) *(1/2 page maximum)*:**

Dragon Lake is a valuable resource both regionally and provincially. The recreational fishery is popular for its reputation of large rainbow trout and high catch rates. This fishery results in approximately 8,500 angler days annually and is an important contributor to the local and regional economy, especially considering the economic downturn in the forestry industry (reduced logging and mill closures or shift reduction in Chasm, Williams Lake, 100 Mile House, and Quesnel). Recreational angling will be increasingly important to attract tourists and retain residents. The lake is within Quesnel City limits, has over 6 boat launches, and one large RV park.

In addition to the valuable sport fishery, Dragon Lake also hosts a FFSBC egg take station which produces nearly 50% of the rainbow trout stocked into British Columbia lakes. There is not another lake that could replace Dragon if issues arose in returns to the egg station.

5. **Outline how you will measure the specific <u>recreational benefits</u> expected as an outcome of this project. Specifically, how does this project improve *fishing quality*, *satisfaction* and/or *access*? To the best of your knowledge, what is a realistic predicted change (%) in your performance metric? Please provide details regarding immediacy and longevity of benefit. (*1/2 page maximum*):**

This project aims to decrease goldfish densities, reducing competition with rainbow trout to increasing their growth and survival with the desired effect of increased numbers and size of rainbow trout available to anglers and the egg take station. The goal is to increase mean rainbow trout size and abundance by at least 40% of current values. These goals can be monitored through returns to the egg station and through scheduled gill net surveys.

It is hoped that increased fish size will result in increased angler effort. Angler effort is scheduled to be monitored from 2023-2025 using aerial effort counts, the egg take station is evaluated annually, and the next planned stock assessment (overnight gill netting) is in 2020. All of these assessments should evaluate the effectiveness of Goldfish control using boat electrofishing should it be approved to proceed.

6. **Identify the FFSBC funding objective(s) this project addresses:**

- ☒ **(1) Increase angler satisfaction**
- ☒ **(2) Maintain a strong angler participation base**
- ☒ **(3) Maintain and improve the diversity of freshwater fishing opportunities**
- ☒ **(4) Maintain and improve wild and enhanced fish stocks to support freshwater recreational fisheries**
- ☒ **(5) Expand opportunities for shared stewardship**
- ☒ **(6) Improve program delivery**

7. **For *Stock Assessment* and *Research & Development* projects ONLY – Clearly but briefly demonstrate the linkage between the deliverables in (3) and a specific actionable solution that will address funding objective selected in (6) (1/2 page maximum):**

8. **Identify any higher level regional/provincial/FFSBC plans that this project supports:**

BC Freshwater Fisheries Program Plan

2020-2025 Cariboo Region Small Lakes Operational Plan

9. **What is the significance to regional/provincial management and implications of not receiving funding:**

Competition from goldfish may be causing declines in the valuable sport fishery and hatchery operations on Dragon Lake and further declines may be possible.

10. **Describe what cost-effective measures are you proposing to maximize value for money (e.g. in-kind/funding partners, graduate student involvement, opportunistic collaborations, equipment sharing, etc.)? Note that specific budget details should be captured in Section 4(2).**

Regional FLNRO biologist time to analyze data and write feasibility report. 20 days = $8,000 in-kind contribution.

11. **Indicate what conservation value you feel this proposal provides relevant to the fishery of interest (high, medium, low) and explain why.**

Not sure how this applies to a population maintained through hatchery augmentation, but in a more broader sense goldfish may present a threat to other wild trout stocks in productive lakes. Information gained through this study would allow better evaluation of the risk of goldfish to game fish populations, and provide a tool for mitigating impacts.

12. ***Optional* - Provide any other pertinent information to support proposal (e.g. Is it part of a larger initiative?):**

PROGRESS UPDATE FOR MULTI-YEAR PROJECTS ONLY

Note that this section will be used to help determine if the project can be streamlined for review purposes.

YES	NO	
☐	☐	**(1) Is your project proceeding as planned?** **If not, identify challenges or issues and how you are addressing them:**
☐	☐	**(2) Is the project scope unchanged?** **If changed, explain why:**
☐	☐	**(3) Is the budget unchanged compared to last year's forecast (i.e. within 10% of previous estimate)?** **If changed, explain why:**

(4) Please identify activities completed for the current year (*bullet form*):

(5) Please identify what activities remain, and if you expect to complete them on time (i.e. end of this fiscal year) (*bullet form*):

SECTION 3 – PROJECT DATA AND STANDARDS

All project proponents are required to adhere to provincial standards for data collection and storage set forth by the applicable technical committee. It is recognized that not all data types currently have provincial standards. Please indicate your sampling and data capture methods and justify any deviation from provincial standards.

(1) Methodology:

Describe the techniques you intend to apply for each project objective to deliver your project. You may simply reference standardized protocols where they exist (e.g. RIC7 gillnets, SLIM boat counts). Where they don't exist, provide adequate detail for review purposes. Please note that this component will be reviewed as part of the technical feasibility score. Poorly described or lacking methodology will be reflected in a poor technical feasibility score.

Boat electrofishing will be used in the spring of 2021 to 2023 to capture goldfish. Boat electrofishing in lakes has been proven feasible in waters less than 3 metres and temperatures above 4C. The boat travels along the shoreline with crew looking for goldfish. Once goldfish are spotted, electrofishing begins and continues to fish the area until goldfish numbers have been depleted to levels where catch is not efficient. Goldfish will be euthanized and disposed of. A sample of goldfish (100-200 per year) will be dissected to determine sex and maturity and otoliths collected. Scales and otoliths will be collected to determine age. Fork length and weight will also be measured. Size and age at maturity will be determined.

Fishing is planned to occur for four years. FLNRORD staff or local volunteers will survey the lake in the spring to evaluate if goldfish are in shallow water to notify the contractor to begin fishing. FLNRORD staff will help with fishing at the beginning of each fishing event. Each fishing event is planned to occur for 2-3 days (10-14 hour days) or until fishing is ineffective. The population will be rested for approximately one week to allow the fish to become more catchable again. A second event will occur each year avaig lasting 2-3 days. At each site and day the total numbers of removed goldfish will be estimated (use bins, and a count of one bin to extrapolate). Effort will be recorded daily (shocking seconds). Year to year population estimates will corroborate previous within-year population estimates. Numbers of mature fish removed will be estimated using the age/size at maturity data and the depletion estimates. FNLRORD staff will partner with Brett van Poorten to populate a population model to estimate timelines for the goldfish population ot recoved given how much fishing has occurred and to which age classes.

Goldfish removals and biological sampling will be conducted for four years. After the fourth year, hopefully the spawning goldfish population will be reduced by at least 70%. If mature age classes have been significantly reduced, it maybe possible to maintain low population densities by electrofishing once every 4 years, as has been found on Paul Lake (Thompson Region, Pers Comm Gene Tisdale).

The methodology described above has been developed and proven successful on Paul Lake, Thompson Region, BC. Incidental catches of rainbow trout will be avoided and released ASAP. Bycatch has not proven to be an issue on Paul Lak and preliminary studies on Dragon Lake in 2019 suggest a similar scenario for Dragon Lake.

A report will be drafted to describe results from the study (e.g. effort, catch, fish data, population estimates, ect) and to describe a future goldfish control plan with cost estimates.

Data to be collected *(choose all that apply)*:

☐ Acoustic and Trawl Survey	☐ Fish Counts – Fish Trap
☐ Acoustic/PIT/Radio Tags	☐ Fish Counts - Snorkel
☐ Creel Survey*	☐ Fish Counts –Spawner/Redd Count/Fence
☐ Effort - SLIM boat counts	☐ Gillnet- standard (RIC7 floater and sinker)
☐ Effort - other counts (camera, ground)	☐ Gillnet- other (justify)
☒ Electrofishing	☐ Habitat Assessment
	☐ Other explain

*standard creel surveys are available through LL and SL committee co-chair or committee intranet site.

(2) Standard databases to be used:

☒ Small Lakes Database ☐ EcoCAT/CLIR ☐ Regional database

☐ Provincial Database (which one) : explain

☒ Other: Excel spreadsheets to document catch, effort, and biological fish data

SECTION 4 – REFERENCES

Please identify any relevant references including embedded URLs to facilitate reviews, especially when referring to grey literature

SECTION 4 – PROJECT BUDGET

(1) Budget breakdown:

2014-2015	**Details** (describe how $$ will be spent)	**Total Cost**
Labour Costs (professional services, etc.)	three-person crew for two days, including transportation, meals, accommodation and equipment would be ~$8330 plus GST. With three two-day events, the overall cost would be ~$25000.	$25,000
Administrative Costs (include fees added by contractor)		$
Operational Costs (travel, equipment, materials purchases, rentals, etc.)		$
	TOTAL:	$25,000

(2) Other Funding Partners

Organization	In-kind* Amount $	Cash Amount $	Confirmed (Y/N)	Total $
FLNRORD – Cariboo Region	**$8,000**		**Y**	**$8,000**

Please describe the types of in-kind contributions from your partners and explain how you calculated the monetary value of these contributions (e.g. hourly or day rate). **Please use $300 for technician, $400 as the in-kind equivalent for FFSBC/govt/contractor biologist and $600/expert (e.g. modeller)*

(a) : 20 days FLNRORD Regional Biologist time.

(b) If you do not receive partnership funding, what are expectations for the delivery of this project: Click or tap here to enter text.

(3) Total Project Costs

Total Partner Amount $	Total FFSBC Amount $	Total Project $
$8,000	$25,000	$33,000

(4) Identify any capital purchases that exceed $1,000:

(5) Describe any expected maintenance costs and source of ongoing support:

(6) For Multi-Year Projects, total historical, current and future FFSBC costs by year (max. 5 years) (*note that this will be returned to proponent if not filled out for multi-year projects*):

Year of Project	Total Cost	$ Requested	$ Approved	$ Expended	comments
1	$33,000	$25,000			
2	$33,000	$25,000			
3	$33,000	$25,000			
4	$33,000	$25,000			
5					
TOTAL $	$132,000	$100,000			