Fish Habitat Management System for Yukon Placer Mining

Economic Health Monitoring Protocol Wave 7 Panel Survey Findings

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Introduction

A new system for managing placer mining activity under the *Fisheries Act* was implemented by the Yukon Placer Secretariat in 2008. As part of the system, the Economic Health Monitoring Protocol was developed to measure and signal whether a viable placer industry is being maintained under the Fish Habitat Management System for Yukon Placer Mining. Implementation of the Economic Health Monitoring Protocol requires the use of a *panel survey* designed to determine whether changes in placer industry viability are attributable to the integrated regulatory regime. The panel survey is based on the premise that "fish can't talk but miners can."

The seventh wave of the panel survey was undertaken on November 15, 2014 in Whitehorse, Yukon at the Canada Games Centre. Attendees at the Wave 7 session included five placer miners, one Yukon Energy, Mines and Resources official and a consultant to the Klondike Placer Miners Association. Completed panel surveys were received from all five placer miners in attendance. Six additional surveys were received by mail. Thus, the population size (n) for the Wave 7 panel survey is 11. This report presents the findings of the Wave 7 panel survey.

Participants in the inaugural wave of the panel survey on April 3, 2009 provided many insights regarding how to improve the Wave 2 survey. In response to those insights, the panel survey instrument was extensively revised to improve its relevance and clarity. Please note that as a result, some of the findings of the Wave 2 through Wave 7 surveys are not directly comparable to the findings of the inaugural Wave 1 survey. Thanks are again due to panel survey participants who so articulately shared their experiences and knowledge.

Wave 7 Panel Survey Findings

To get them thinking about their placer mining season, participants were asked to describe in a line or two "how placer mining went for you this past season". Participants' verbatim responses included:

- *Our season was an average one. We got enough gold to be able to continue mining next season.*
- *In the end – good. Was a moving year to new sites. The start of season was poor ground and the transition did not help. The finish, made the season.*
- *So so.*
- *Reasonably average season. Challenged by weather, equipment breakdowns, lower gold price / fuel cost ratio, confused by various government departments and regimes and special interest groups.*
- *Slow season – no rainfall this year. All small creeks were dry. Our creek had very low flow which slowed the operation down.*
- *We had numerous mechanical breakdowns at the start of the season which put us behind and we were not able to make that time up so we fell short of our production goals. Also had trouble finding qualified workers this year.*
- *The mining (sluicing) got very off to a very late start (mid-July). As a result, there was far less sluicing accomplished at the end of the season than was planned for. Fortunately, the fall was warmer than usual, so*

sluicing was able to be done until October 13, a record for my mining years.

- *Our season was not very good. We got behind in gold production and had a hard time catching up. We lost three weeks and three days of time because of our main machine was damaged in an accident.*
- *Went well. Mostly I was preparing my bench claims for next year i.e., stripping, road building, etc. Also trucking pay to plant, sluiced about 150 hours.*
- *Good production but lower returns due to poorer grades. Good exploration success with auger drilling, however, we were unable to properly capitalize on our additional employees due to training and or competency issues.*
- *Went okay. The gold recovered was less than usual. This was due to the values in the ground lessening primarily. Plus extra heavy glacial ice on top of cuts prepared for season.*

Size of Operation

Panel survey participants were asked to indicate the size of their total operating costs [fuel, repairs, maintenance, labour, etc.] in 2014. Counts of participants' responses are outlined in the table below.

Total operating costs in 2014	Number of Respondents (11)
less than $50,000	0
between $50,000 and $250,000	3
between $250,000 and $500,000	4
between $500,000 and $1 million	1
between $1 million and $2.5 million	1
between $2.5 million and $5 million	1
more than $5 million	1

Permitting Experiences

Nine out of eleven panel survey participants (82%) indicated they had permitted a placer operation in 2014. All nine participants who permitted a placer operation under the new placer system in 2014 indicated that more effort was required than was their experience in the past. The additional effort was described as:

- *More attention to the diversions for one, more time to complete the application process.*
- *Additional information gathering in the field; more complex planning and assessment, YESAA had more information requests regarding diversions.*
- *It was seven years ago but had to start from scratch. The questions were worded different, worksheets are very complicated and technical.*
- *For the first time in 40 years we hired a consultant to help us get a water license.*
- *YESAB section takes quite a bit of time; environmental health permit was time-consuming; hazardous-waste permit was very time-consuming; Fire Marshal – storage tank system permit; waste management permit.*
- *Initially experienced extreme difficulties in understanding new application and process. Seemed designed for larger projects and not for family-based Yukoners. Estimate paperwork and data collection took 15 to 20 times the time previously applied for.*

- *It takes a lot more time. I hired a consultant and by the time you shepherd it through YESAA and then Water Board it cost $5,000 to $10,000 - if all goes well.*
- *Had an agent help with the process and even though I was not hands-on, the level of detail was noticeably greater and the timeframe from YESAB seemed longer.*

The additional costs were described as:

- *Likely approximately 2 to 3 days extra office work completing application at $500 per day = $1,500 additional cost.*
- *Purchased GIS software to properly model much expanded channels required; utilized a high resolution ortho photo to ensure sufficient room for features; estimated additional cost of $250 +100 hours to train and learn and apply program.*
- *Had to hire someone to help with the technical aspects, estimated additional costs of $5,000.*
- *Direct extra cost for the consultant was approximately $5,000.*
- *In spite of how carefully all the questions are answered, the people at YESAB seem to delight and asking the most ridiculous questions, which often have no relevance to the outcome of the project anyways.*
- *Hours of my time, I don't have a cost.*
- *Time; paper and printing and research; fees and long-distance communication costs; an estimated $5,000 in additional costs.*
- *For the permitting itself – and a lot of this is just YESAA and the Water Board, the cost has increased from around $3,000 to around $10,000.*
- *Actual fees from agent, and time lost describing and or explaining situations, estimated additional costs were $5,000.*

Water Quality Sampling

Four out of eleven panel survey participants (36%) found it necessary to take additional water quality samples in order to comply with the new placer system and reported the additional number of samples required as:

- 24 additional water samples.
- 60 additional water samples.
- 4 additional water quality samples.
- 48 additional water quality samples (3 additional weekly x 16 weeks).

Settling Ponds

Five out of eleven panel survey respondents (45%) reported that greater effort was required to maintain or improve settling ponds. Level of effort and estimated average cost per machine hour were reported as:

- 40 machine hours ($220 per hour).
- 50 machine hours ($225 per hour).
- 39 machine hours ($200 per hour).
- 80 machine hours ($200 per hour).
- 500 machine hours (mostly D11R and D11T, $400 per hour, includes both diversions and settling pond construction).

Diversion Channels

Five out of eleven panel survey respondents (45%) indicated that greater effort was required to construct new or improved diversion channels in order to be compliant with the new system. Associated levels of effort included:

- 30 machine hours
- 35 machine hours
- 20 machine hours
- 60 machine hours

Two respondents indicated they had made a more rapid transition from using temporary diversion channels to using final restoration channels in 2014. Factors considered when deciding to make a more rapid transition to final restoration channels included:

- Valley bottom constraint issues (narrow valley); trying to reduce yearly footprint of mining operation (though more complicated); availability of erosion-resistant materials (boulders) during mining process.
- We wanted to get the creek into its final restoration channel as soon as possible because we needed to make space for a mine cut. We also wanted to get the final channel approved by the mining inspector.

Zero Discharge Approach (100% Recirculation)

One respondent indicated they moved to a zero discharge approach (100% recirculation system) in order to conform with more restrictive discharge standards and noted that they incurred $12,000 in additional costs for pump servicing and rebuilds.

With regard to perceptions about whether the gold recovery rate has been affected, the respondent stated: "I don't think I am too affected due to the coarseness of the gold I'm recovering, but have not checked tailings to see if I am losing fines that I am not seeing."

Another respondent noted that "due to the location of our mine (3,000 feet from the creek and up a hillside), we have used 100% recirculation for several years. This system is more economical than discharging the sluice effluent, nothing to do with discharge standards."

With regard to perceptions about whether the gold recovery rate has been affected, the same respondent stated: "I have no actual test data, but I would suggest that our recovery of gold under 30 mesh has diminished. When the settleable solids get to 500 or 800 ml / litre at the end of the day, it has to have a significant effect".

Eight out of eleven respondents (73%) indicated that they had considered moving to a 100% recirculation system but are unable to do so because of the physical characteristics of their placer claim (e.g., steep valley walls, significant groundwater flows, valley gradient).

Other Operating Activities to Ensure Conformity

Four panel survey respondents reported having to undertake other additional operating activities in order to conform with more restrictive sediment discharge standards. Additional activities included:

- *I do have to clean ponds more often to meet the tougher standards but because of the low hours sluicing and the size of my pond I did not have to do much this year to them.*
- *Created an intermediate settling pond to double retention time. Overall operating costs estimated to have increased by 10%.*
- *Design, experimentation, and implementation of new settling system. Trying to incorporate overlapping rock matrix settling ponds into mining plan to reduce sediments in a progressive manner. Overall operating costs estimated to have increased by 8 to 10%.*
- *Had to keep our sluice pump in tight recirculation to try to minimize the impact of the effluent seeping through into other dredge ponds. This increased wear on pump and reduced efficiency at sluice plant. Overall operating costs estimated to have increased by 1 to 2%.*

Opportunity Costs

Previous panel survey participants indicated that opportunity costs (e.g., time spent on designing new pond systems, time taken away from sluicing to do additional sampling, etc.) associated with the new placer system are significant. When asked to describe their opportunity costs and estimate the number of additional hours, participants said:

- *The ground I am mining already had large settling ponds in place, and my water license allows in stream settling and to use the stream as a conduit. If not for this specific license the ground would not be viable to mine.*
- *Moving ponds around the [____] site, to accommodate the dewatering effluent and the sluice pump pond is always a hassle and time consuming. However, it is part of the mine plan and probably not directly affecting the bottom line.*
- *We spent 500 machine hours in the fall with two D11 tractors, this meant that fall stripping was curtailed when we had thaw to move.*
- *As I am experimenting with subsurface settling in overlapping rock matrix ponds, more machine and personnel time was needed to repair flaws in the implementation. Longer cycle times on tailings disposal are also a result. Time delays for amendments to water license are anticipated costs. Increased cost from piggybacked department regulations (i.e., fuel, camp, waste disposal etc.) have been added to water license. Also has increased costs from added paperwork, telephone, time, etc.* Additional hours were estimated at 250 hours.
- *Extra time and money required to design a mining plan that will be in compliance with the new more restrictive standards. For example, stacking and saving soil to spread during reclamation, building new ponds to ensure adequate settling time. Additional hours estimated at 40 hours.*
- *This has not affected my mining project last year (it was in its final year of production). But next year, starting a totally new project, it will be a significant factor.*

- *Roughly 30 extra hours for settling pond construction and 20 extra hours related to stream divergence is approximately the same as five days of lost sluicing time. I would estimate 50 hours or five days of no sluicing could be roughly 50 to 100 ounces of gold not produced.*
- *I am moving my operation to a new area next year and there was a bit of time spent planning to be sure I meet the new standards and the time could have been spent sluicing on the ground I was on this year. I will be back to it in three or four years once this better ground is mined out.*
- *Thankfully we were able to accomplish additional works after the production season. In season, there's half a person day per week on sampling and inspections of structures over a previous level. This is done at supervisor or above level. Additional hours were estimated at 80 hours.*
- *Time spent the building larger ponds etc. took away sluice time and therefore profit. Additional hours were estimated at 100 hours.*

Number of Placer Mines

The number of placer mines in operation in the Yukon changes from year to year. Panel survey participants were asked, based on their own placer mining experiences in the last year, what they thought the top five factors were that could have contributed to a change in the total number of placer mines in operation in the Yukon in 2014. Their responses are outlined below:

Most important factor	No. of responses (11 total)
price of gold ($US or $CDN)	6
quantity and quality of the gold resource	5

Second-most important factor	No. of responses (11 total)
fuel costs	5
price of gold ($US or $CDN)	2
permitting costs / delays	2
labour costs	1
quantity and quality of the gold resource	1

Third-most important factor	No. of responses (11 total)
equipment costs	3
fuel costs	2
labour costs	2
quantity and quality of the gold resource	2
new minesite management costs	1
quantity and quality of the gold resource	1

Fourth-most important factor	No. of responses (10 total)
permitting costs / delays	3
fuel costs	2
natural conditions (snow pack, water flows, fires, etc.)	2
quantity and quality of the gold resource	2
equipment costs	1

Fifth-most important factor	No. of responses (10 total)
equipment costs	4
labour costs	3
fuel costs	1
permitting costs / delays	1
new minesite management costs	1

Gold Production

Panel survey participants were asked, based on their own placer mining experiences in the last year, what they think were the top five factors that contributed to the change in gold production at their placer operation.

For survey respondents who reported an increase in production:

Most important factor	No. of responses (2)
labour cost	1
increase in the volume of material sluiced	1

Second-most important factor	No. of responses (2)
equipment costs	1
quantity and quality of the gold resource	1

Third-most important factor	No. of responses (2)
workers' compensation laws	1
availability of trained employees	1

Fourth-most important factor	No. of responses (2)
fuel cost	1
higher equipment availability	1

Fifth-most important factor	No. of responses (1)
transportation cost	1

For survey respondents who reported a decrease in production:

Most important factor	No. of responses (5)
quantity and quality of the gold resource	3
equipment costs	1
new minesite management costs	1

Second-most important factor	No. of responses (4)
labour and lack of skilled labour	1
minesite management	1
ability to mine is a systematic manner	1
natural conditions	1

Third-most important factor	No. of responses (3)
ability to mine is a systematic manner	1
quantity and quality of the gold resource	1
labour costs	1

Fourth-most important factor	No. of responses (3)
fuel costs	2
equipment costs	1

Fifth-most important factor	No. of responses (3)
natural conditions	2
equipment costs	1

For survey respondents who reported that production stayed the same:

Most important factor	No. of responses (4)
quantity and quality of the gold resource	2
gold price	1
finding good labour	1

Second-most important factor	No. of responses (4)
gold price	1
equipment costs	1
fuel costs	1
borrowing costs	1

Third-most important factor	No. of responses (4)
equipment costs	2
labour costs	1
gold price / fuel price ratio	1

Fourth-most important factor	No. of responses (4)
new minesite costs	1
natural conditions	1
borrowing costs	1
quantity and quality of the gold resource	1

Fifth-most important factor	No. of responses (4)
labour costs	2
ability to mine in a systematic manner	1
new minesite management costs	1

Labour Requirements

Six respondents reported an increase in labour requirements at their most productive placer operation in 2014. Five respondents reported that their labour requirements were about the same.

Reasons for the increase in labour requirements included:

- *We needed more people to get more hours of productivity.*
- *To try to offset the lower gold price/fuel + labour ratio plus working leaner ground.*
- *Attempted to hire more skilled workers to catch up from being behind due to mechanical breakdowns early in the year.*
- *Inexperienced workers (takes more to do the same job).*
- *To attempt to strip ahead while maintaining full-time production, to allow senior person (me) more time to plan/inspect/develop mine.*
- *Competition with oil patch and Arctic wages.*

Claim Staking

Panel survey respondents were asked, while thinking about the overall Yukon placer industry during the past year, whether the total number of placer claims staked increased decreased or stayed the same.

Reasons given by panel survey respondents for the increase in staking included:

- *If staking increased than it was likely because of the need to find additional ground.*
- *Primary reason is a small but determined the group staking leases for sale – driven by the additional exposure from TV shows; most are good quality moose pasture.*
- *If the staking has increased, I would say it is because we are looking for new ground so that we could keep mining into the future.*
- *Publicity from TV shows.*
- *Speculation. Due to increased exposure to recent reality shows, inexperienced adventurers are buying property and leasing claims creating a demand.*
- *Lower gold price, less interest.*
- *Gold price.*
- *The price of gold is still up in value.*

Reasons given by survey respondents for the decrease in staking included:

- *Limited staking opportunities, not much ground left.*
- *World economy.*
- *Known productive ground is running out and new discoveries will be needed for this industry to survive. However, the regulatory burden his continually increasing which restricts that process.*

Fuel Consumption

Four respondents reported that their fuel requirements stayed about the same and seven reported an increase in fuel consumption.

Primary reasons for the increase in fuel consumption noted by panel survey respondents included:

- *Quality of the ground being mined (7 respondents).*
- *Fuel efficiency of earth moving equipment (2 respondents).*
- *Fuel prices (1 respondent).*

Additional reasons for the increase in fuel consumption included:

- relocation of mine.
- more hours moving earth.
- implementing water license.
- additional pumping system due to distance from water source.
- extra work related to new regime.
- more hours on machines.
- quantity of ground moved.
- removal of ice glaciers.

When asked if the change in fuel consumption was attributable to the new placer system, respondents indicated "yes", for the following reasons:

- *We are using fewer pieces of gear to move or sluice the dirt, also have started using rubber wheel machines i.e., dump trucks.*
- *The construction of large dikes to contain dewatering water and supply sluice water are directly the result of a reduced discharge level needed for the creek.*
- *500 hours with two D11 tractors each burning 40 gallons per hour.*
- *I feel I have incurred increased fuel costs since my new water license has been granted. Mainly implementing a new system of waste treatment.*
- *We burned and extra 50 hours worth of fuel as a result of the new regime. 50 hours (approx.) x 40 litres per hour = 2,000 litres of fuel.*
- *Some of the Cat hours were spent on stockpiling top soil.*
- *Yes, additional machine time on diversion construction and pond development adds approximately 100 machine hours in a season.*

Expansion into New Areas

When asked if the new Fish Habitat Management System for Yukon Placer Mining discouraged them from expanding into new areas, six out of 11 respondents said 'yes'. Comments from respondents who said 'yes' included:

- *Partially for sure. Knowing that classifications are so tough it's discouraging. In areas that are not yet classified then it is very discouraging to consider the wait time to proceed.*
- *I do not believe that I could get permitting in a new area.*
- *We would like to prospect and develop a creek that has historically been a gold producing stream, but it is classified as moderate-moderate, therefore the restrictions are such that it may not be economic.*
- *I recently dropped two 5 mile leases due to a realization of how frustrating it would be to go through the permitting process to actually mine it, i.e., a system that labels every indentation on the side of a hill (as shown on a topo map) as a fish habitat is not one I wish to participate in. I will continue to mine my existing low-grade claims until I retire, rather than spend the time and money to move into a new area.*
- *Having recently worked through the licensing process has at the moment opened my eyes to the restrictive nature of the management system for those miners trying to open non-traditional mining areas. In my opinion, the risk and restrictions and investment required outweigh the potential rewards.*
- *Areas that are labeled as productive for fish are difficult or impossible to make diversions in. If you cannot divert the creek and or if the valley is narrow and you cannot have a temporary diversion in your work area it is no use looking for a gold resource there.*

Quality of the Gold Resource

A key factor that influences the health of the placer industry, but which is very difficult to measure, is the extent to which all of the "good placer ground" has already been mined out.

Participants were asked to consider their own placer operation over the past year and to identify the extent to which the quality of the placer gold resource on the claims they mined affect the health of their placer operation. Their responses are outlined in the table below.

Extent to which the quality of the placer gold resource on claims mined affected health of the placer operation in 2014.	
Degree of extent	**Number of responses (11)**
not at all	0
to a small extent	2
to a moderate extent	2
to a great extent	7

Additional Comments

Panel survey participants were also asked if they had any other comments about how the new Fish Habitat Management System affected their placer mining operation this past season. Participants' responses are outlined below:

- *Having inspections on the board with the miner is huge. Inspectors that understand the business and the challenges from both points of view are key. The majority of the impacts to the environment and such are extremely short term, when one steps back and really examines the process. Having inspectors that can see that is very helpful to the industry as opposed to inspectors that are following things verbatim.*
- *In many ways inspectors and miners are working very well together. Our biggest problem going into the future is the fact that it is difficult to move to new areas because of the more stringent standards, especially in the area of diversions.*
- *Only time will tell if the mining industry will adapt to the new regime and how it is practiced by the regulatory bodies.*
- *We have to meet fuel storage guidelines in the water license package which is strict and provides safe storage. We also have to apply for waste management which covers hazardous waste storage as in the Water License as well as garbage (household). We have to be permitted through Community Services/Fire Marshall/Storage Tank System Permit. These should be able to be addressed (and I feel they are addressed) in the Water License package. Too many departments are involved and they each want the same info.*
- *The industry is constantly facing new regulations, seemingly dreamt up by government employees with not enough to do or those wishing to justify their jobs or those who mean well but don't stop to consider the negative affect those regulations will have on the jobs and economic well-being of the placer mining industry. The latest wave of regulations is now targeting protection of certain species of plants and birds and the wetlands they claim we are destroying. Our reclamation requirements create nice wetlands when*

we are finished mining, but now that is no longer sufficient. When will this regulatory creep and overreach stop!?

- *My background is a [____] in [_____], which included a stint doing stream surveys (i.e., fish invertebrates/chemical analysis/stream flow). During the late 1970's I did my own assessment of [_____] Creek. This indicated that the actively mined area is devoid of fish and invertebrates. However, the upper limits of the creek still had all the necessary invertebrate life to repopulate and subsequently sustain fish in the mined out areas once mining was finished, or cleaner water appeared. This notion was ridiculed by the Fisheries Branch who persisted with the attitude that fish will never return to a mined out creek. In the 80's a 5 mL per litre standard was brought into effect. That summer, for the first time since I started mining in the 70's, grayling appeared in my pump pond. They have frequented [_____] Creek ever since. The standard is now at 0.2 mL per litre, just barely measurable by an Imhoff cone. According to [EMR official] the new regime has been set up so as to only tighten the regulations not loosen them. What is the truthful end objective to this process? To force all miners into total recycling with no discharge whatsoever at any time? It is not possible for a mine to do this 100% of the time. There are always circumstances of rising to prevent this. New regulations do not acknowledge this. What is the true socioeconomic benefit of tightening regulations? Perhaps Fisheries should have done a survey over the years to assess the changes in fish populations as the water standards tightened. My guess would be that a 0.2 mL per litre standard is totally unjustified, never mind tightening it more! Several years ago, I noticed fish swirling in my pump pond. An attempt to catch them with a fishing rod failed. However, there was a spot that yielded results. That was an area where our turbid sluice effluent entered the stream, creating a mixing flume extending down stream for a ways. Seemed the fish like to hide in the murky water while waiting for food to float downstream to them. In other words, you don't always need crystal-clear water for fish to flourish!*
- *I feel the biggest problem with the new regime is the lost potential of other creeks that have been gold producing streams. Some of these creeks have been reclassified at a more stringent environmental standard. This higher level of protection may cause the streams to never be mined.*
- *Because the price of gold is good now and my age, I am moving to an area on my ground that I have been working toward for a number of years. I believe that it is very good ground and it will take me to the end of my current water license. And at this time I am not sure how I will handle applying for a new one because it is so much work. And I am not sure that I have the skills needed to do it. And there are not many people that I know of doing the work.*
- *New placer regulation has most detrimental impact on those areas nearest main tributaries which may hold developable resources. These areas are effectively removed from development and will not in the near future be added to the wealth of Canada.*
- *Health of the industry is partially dependent on the quality of the placer inspectors and their willingness to work with the placer industry instead of just being police. And of course the directions to inspectors are given from their bosses (management).*