Experience gained using Jordan-Scotty Salmonid Egg Incubators, A learning tool

June 2016 by The Friends of the Kouchibougacis
Acknowledgements

The long list of people contacted at the many establishments that helped and encouraged the creation and progress of this project were one the main reason for the success of this project. Their expertise and advice were priceless in guiding us in accomplishing the needed tasks within the recommended norms and in an efficient manner;

Thank you to the Friends of the Kouchibouguacis Board of Directors and staff. Special mention should be made for the Friends of the Kouchibouguacis staff members; project coordinator, Anita Doucet; field technologist, Samuel Gallant and assistant, Andrée Frigault, for the relentless efforts they put forward this project. Thank you to Adelard Vautour for your valuable expertise and time. Thank you to the many volunteers who helped us out with crucial steps throughout this project.

This project was financially supported by: The New Brunswick Wildlife Trust Fund and the Atlantic Salmon Conservation Foundation. We wish to thank their staff members; special thanks to Claire Caron and to Darla Saunders.

Thank you to The Environmental Trust Funds and to their staff.

Thank you to the staff at The Miramichi Salmon Conservation Centre for the help provided in hatchery services. A special thanks to Mark Hambrook and Nola Chiasson for your willingness to share technical and other type of information.

Thank you to the Municipality of Saint-Louis and Elsipogtog Fisheries for their financial and in kind support.

Thank you to The Department of Fisheries and Oceans and Environment Canada- Moncton and Mactaquac for their continued valuable expertise and time support. Special thanks to Sophie LeBlanc for her expertise during the electrofishing sessions.

Thank you to Parks Canada- Kouchibouguac National Park Canada and Fundy National Park Canada. Special thanks to Firmin LeBlanc, Karine Bellhumeure, and Kenny Francis for your help with the field support. Thank you to Corey Clark, Eric Tremblay, Léophane LeBlanc and Philippe St-Onge for believing in our organization and projects.

Thank you to the New Brunswick Department of Natural Resources for their interest and in-kind support in our project. A special Thanks to Léon LeBlanc and Ernest Fontaine for believing in the work we do. Thank you to the Ontario Ministry of Natural Resources. Special thanks to Nadine Thébeau for your guidance and encouragement towards this initiative.

We don’t know what we would have done without the awesome help everybody provide us throughout this project! Thanks a million!
Salmon egg incubation using Jordan-Scotty Salmonid Egg Incubators

The Friends of the Kouchibouguacis Inc., the local watershed group based in Saint-Louis-de-Kent, wish to share their experience using Jordan-Scotty egg incubators. This document illustrates an overview of the progression of the planning and preparation of the project, and an outline of the methodology used for the preparation and installation of the incubators. Difficulties, adjustments, recommendations, various partnerships and costs will be briefly addressed in this document. This document may be used as reference and modified to the users needs since watercourses vary considerably when it comes to gradient, meanders, substrate types, habitat type and availability, etc. Some users may be able to use some of the methods we initially used as some users will opt for the modified methods…We hope this document will encourage other people to use the Jordan-Scotty incubators as we are starting to see positive results.

Please don’t let the quantity of pages included in this document make you think that incubation installation is a terribly difficult charge; incubation installation does require some planning ahead, and some attention to details. This is simply a compilation of the information we gathered along our journey that we wish to share with hopes to ease the process for those who are looking into this type of stocking. **A simplified point form summary is included at the end of the document showing the step-by-step process we are presently using. You may print the summary and include it in your incubation equipment kit and use it as a guide…although we strongly suggest reading the entire document in order to better comprehend the reason we follow this process! (see Annexe A for printable summary).**

Planning and preparation:

Before even setting foot in water, we had to determine when and where the project was going to take place. For location, we opted for the Ruisseau de la Truite, the largest tributary linked to the Kouchibouguacis River. We opted for this brook for several reasons; since we are new at incubator installation, we wanted to invest our efforts where spring ice flows would not represent significant threat to the incubators’ ability to stay put. The Ruisseau de la Truite is undoubtedly a brook that already has some Atlantic salmon present. **We mustn’t forget that important detail!...some brooks naturally do not have salmon populations; a pre-monitoring exercise and/or consultation with specialised people may reveal this about certain tributaries present within your watershed.** Another reason for choosing this brook was accessibility. Several access roads, trails and ways were readily available for our use in order to reach different parts of the brook, rendering it very appealing for successfully accomplishing the field work, but still offer a little seclusion so that the incubators would not be in plain view of the general public. As for when we were going to actually be doing the incubator installation, we opted for the Fall months.

Aiming for Fall offered advantages and disadvantages; the prime disadvantage of conducting such a project in the Fall lies within egg vulnerability. The very recently laid eggs are especially delicate after 48 hours of fertilisation (1.-Flanagan, Jason J., 2003.); at this stage, the eggs are not yet eyed and are called “green eggs”. The challenge here was to successfully accomplish the needed tasks within the very narrow 48 hour window from fertilisation that permitted the handling of the eggs without causing
irreversible damage to them. It should also be noted that the hatchery used for the spawning of the adult salmon, the Miramichi Salmon Conservation Center, is situated in South Esk New-Brunswick; a one hour drive away from where the project was taking place (Saint-Louis-de-Kent and Saint-Ignace area). The advantage of doing this project during the Fall months is the comfort in knowing that the planning of a backup plan would have been possible in case the installation of the incubator was impossible due to unforgiving Fall weather; since eggs from Maritime Atlantic salmon eye up in March and only hatch in April (2. Flanagan, Jason J., 2003.), the incubators could be loaded up with eyed eggs and installed in the brook early Spring. Even though eggs are tougher when eyed, we did not consider Spring incubator installation as a first option for fear that ice and snow would add more challenges to our already limited familiarity with the incubators.

TFK staff members conducted a habitat survey in order to have a better notion of its available areas for the spawning of Atlantic salmon. The survey provided us with the location of areas susceptible to erosion or areas that cause sedimentation, and the location of polluted areas; the survey would play a major role in selecting site for the installation of the salmon eggs incubators.

Some sites were examined and deemed potential incubation sites; sites that had gravelly bottoms suitable for salmon spawning, some riffles that were at the tail end of pools, sites that had more of a cobble type substrate downstream from the incubation set-up, sites that were not subject to erosion, sedimentation, and sources pollution, sites that were readily accessible in areas that still presented a fair amount of seclusion. Photos of potential incubation sites were taken following the protocol established by the Canadian Aquatic Biomonitoring Network; the first photo taken was of the field sheet, or in this case, a photo of the page in field booklet showing the site number, the second photo was of the upstream view, the third one was of the downstream view, the fourth one was of the across view, and the fifth one was of the substrate. The substrate photos should include a ruler or some sort of object having a universal size that can be compared with the substrate in order to give a better indication of size. All potential incubation site photos were taken using a digital camera and were taken in that specific order for every site (3. Carter, L., Pappas, S., April 2012.). GPS coordinates for those sites were noted and recorded in the field booklet. Possessing this bank of photos and GPS points for potential sites was most beneficial when it was time to choose the sites that were going to be used for incubation. In order to save time and to efficiently use the limited hours of daylight Fall offers, we opted for sites that were rather clustered together.

Here is a list of items and services you may consider when planning the finances to cover the incubation part of this project:

Salary for coordination/field support
Salary for field technician
Travel cost to get the eggs and install incubators
Purchase of incubator units and related accessories
Ovadine solution
Hatcheries fees if needed
YSI rental if needed
The Friends of the Kouchibouguacis …2012: “in substrate” installation:

Once we knew the exact location of the sites that were going use for the incubation project, we immediately started planning for site preparations. Incubator set-up includes several aspects that require attentive consideration. A couple of these aspects need to be addressed a few months before the actual incubation period; At the end of August, while the water was still at low levels, TFK staff members made their way to the sites in order to do some of these preparations ahead of time; the collection of rocks that would be used to cover the incubator once they were installed. The rocks would provide some stability and more anchorage for the incubator and would also provide some protection to the fry once they come out of the chambers of the incubator. The suggested size of rocks for this purpose was rocks that were no smaller than our fist, other experiments was rocks measuring from approximately 2 to 6 inches in diameter; these medium to large rocks would permit the flow of water through the prepared pit (description of pit follows in next paragraph) and through the incubator (4. Pritchard, C., 2009). We therefore chose to specifically collect rock no smaller than our fist, and since the individuals actually picking the rocks had different size of fists from one another, the ratio of rock sizes varied nicely within the suggested size and the experimental size. The collected rocks were placed into material bags (like the blue environment friendly Co-Op bags) and placed on the embankment for future use. They determined that it took about four blue environment friendly Co-Op bags to properly cover the incubation unit once it was placed in its pit.

The other task at hand was to determine the exact area where the incubator was going to be installed and dig up a “pit”, or artificial redd, in the streambed. The artificial redd for one incubator having 5 units (pair of plates) was approximately one meter in diameter and approximately 30 cm deep. Not only would the redd assure that the incubator be covered by flowing water at all times, but it would also add to the stability and anchorage provided by the installed rocks, and rebar anchors.

The other task that was done at site during the low water levels was the installation of rebar; Three 34 inches rebar rods were placed in the ground with the use of a sledge hammer. The rods were placed in a triangular pattern; one upstream of the pit and the other two on each side of the pit.

In the fall, the incubators were secured at the bottom of artificial reds we created and attached to the rebar rods previously set out in the brook in a manner to best resist the environmental pressures that the winter months might present, and covered with the collected rocks. The rocks were gently placed, not poured, to cover the entire incubator. All incubators were all set out as indicated in the user’s manual provided by the manufacturer and were all set out well within the 48 hour window allowed for handling green egg without causing harm to the embryos….although we had some good results in egg survival in 2012, observations showed accumulation of sediment within some parts of the incubators and substrate we set around the incubator. This resulted in some egg mortality with an approximate average survival of 63.6% ranging from 35% to 96.9%. The 96.9 % survival result was obtained from the incubator that was totally out of substrate.
The Friends of the Kouchibouguacis …2013: “out of substrate” installation:

The incubators set out during the 2012 exercise were installed as “in-substrate” Jordan-Scotty egg incubators (meaning that the incubators were covered with substrate). In 2013, we opted for the “out of substrate” installation after close observations were done on the recovered 2012 incubators; one of the incubators was totally uncovered (still attached to the rebar) and revealed the best egg survival from the entire exercise. All the other incubators were still covered with substrate and had sediment accumulation in the aft (or downstream) apartments, concluding in dead eggs. We did not collect rock prior to the installation as we opted to install the incubators out of the substrate. The incubators were secured at the bottom of artificial reds we created (approximately one meter in diameter and approximately 30 cm deep) and attached to the rebar rods previously set out in the brook in a manner to best resist the environmental pressures that the winter months might present. A large rock was installed on top of each incubator with hopes to provide extra resistance against the current. All incubators were all set out well within the 48 hour window allowed for handling green egg without causing harm to the embryos…results revealed an approximate average survival of 61.1%, ranging from 47% to 88.9%. A lower survival rate that the previous year shown was probably the result of a harsh spring freshet that caused some damage to the embankment approximately 40 meters upstream of this incubation site. This resulted in having a piece of embankment being anchored in place by one of the incubation unit. The incubation unit was completely surrounded and filled with sedimentation, drastically bringing down the 2013 survival ratio. The survival ratio for that unit was approximately 3.8%. Another observation that was noted was the artificial redds were filled up by sediment, covering the bottom part of the incubators.

The Friends of the Kouchibouguacis …2015: “out of substrate” installation:

In 2015 new incubators have been purchased as environmental pressures took toll on some incubators used in 2012 and 2013. The results obtained during previous years provide room for improvement and inspire further development for future exercises...for instance; in 2015 we decided to make a modification to the incubator installation by adding two pieces of 1 inch square steel tubing to the bottom of the units. The steel tubing was added to offer protection to the bottom of the units, and to also provide a gap between the bottom of the incubator and the riverbed. This should allow the water to flow underneath the units and reduce the possibility of sediment settling around the incubator. We did not create artificial redds. We installed the incubators in areas that would allow them to be covered by flowing water at all times until their retrieval in late June the following year.

Broodstock collection, permits and incubators:

Two smelt fishing box nets are installed in Saint-Ignace area, near the head of the Kouchibouguacis River estuary. The nets are installed at the beginning of September and fished on a daily basis until the end of October. A two to three staff crew during a 2-4 hour per day is needed for fishing and checking the fishing gear every day. A transfer permit for the transfer of Atlantic salmon (adult and/or grill) and the transfer of Atlantic salmon eggs is needed. A stocking plan is presented to the Department of Fisheries and Oceans (DFO) and fishing permit for scientific purposes along with the related tags are acquired prior of the beginning of the project. Signed copies of the permits are carried on site throughout all related activities, regional field supervisors are notified prior to the beginning of the fishing activities and all fishing gears are properly identified. Summary reports on the project activities are submitted to the DFO’s Chief of Licensing once the work described on the permits are completed.
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It should be noted that a fish health analysis was not mandatory prior to transfer of our salmon eggs because we indicated in the disease status section of the request that the eggs will be disinfected using an iodine solution before incubation.

We placed an order for Jordan-Scotty Salmonid Egg Incubators through the Scott Plastics Ltd. company located in Sidney, British Columbia (see Annexe B for company user guide). The recommended incubator plates varied in colours that determine the size of the escape holes; the recommended colour for Atlantic salmon eggs is red. One incubator “unit” is essentially two plates made up of 200 individual chambers. One chamber provides shelter for one egg. Therefore a dead egg that becomes moldy will not affect or infect its neighbour; this feature was one of the selling points to acquiring this type of incubator! One full condo includes five units (ten plates). We ordered six condos of five units each, and decided to order more nuts and bolts than we really needed for the five condos in case we decided to divide up the full condos into semi condos (condo having three or four units). We brought some extra nuts and bolts when going on the installation, in case they were needed during times of unforeseen mishaps or scenarios.

**It is imperative to figure out the amount of eggs you plan to incubate prior to collecting brood stock. One complete unit holds 1000 eggs, and one female salmon may provide anywhere from 5000 to 8000 eggs. If you wish to promote diverse genetic mixture, you will need to use at least two females. This will provide 10 000 to 16 000 eggs, resulting in approximately the installation of 10 to 16 full incubation units. If you predict installing fewer units, a backup plan is needed for the remaining eggs. You may distribute a few for scholastic activities, leave the remaining eggs in the care of professional at a hatchery (be sure to include extra cash for hatchery costs), or use another type of rearing unit such as tanks or silos. One should verify with the Department of Fisheries and Oceans if it is permitted to release unmarked unfed fry in your location prior to deciding on a backup plan. In order to avoid a very large surplus of eggs, you may also simply opt to choose smaller females that will provide fewer eggs for brood stock collection.

Preparations before incubation day:

Disinfecting the incubators:

Manufacturer’s recommendation to disinfect fish egg is a 4 part diluted solution to one part egg ratio (see Annexe C for manufacturer’s recommendations). One 4 Liter jug is quite sufficed for the quantity of eggs and amount of equipment used during a seven incubation unit project (may even be suffice for two years if properly stored). Ovadine can be used as a general disinfectant used on different equipment and can also be used as a fish egg disinfectant. It was recommended that we disinfect the incubators prior to using them. This was also a task that needed to be accomplished ahead of time (we did it a few days before incubation day).

A 250 part per million Ovadine solution for the disinfection of the incubators and loading trays was prepared following the manufacturer’s instructions for recommended dosage and administration methods indicated on the product’s label. The incubators, or all the parts of the incubators, were placed in an industrial sink and soaked in the solution for 10 minutes. Once the time had elapsed, the incubator parts (and loading trays) were rinsed, and placed as a full condo in large disinfected garbage bags (garbage bag also need to be soaked in the Ovadine solution- some garbage bags are treated with
chemicals to prevent the growth of bacteria or limit odor). The bags were then tied off at the top and eventually placed in back packs for transportation.

**Disinfecting solution used on the eggs:**

We also needed to calculate and prepare the needed quantity of Ovadine solution for the disinfection of eggs at incubation sites; A 100 part per million Ovadine solution for the disinfection of the salmon eggs was also prepared following the manufacturer’s instructions. We followed the instructions for the recommended dosage and administration methods indicated on the product’s label (see Annexe C for manufacturer’s recommendations & MSDS). Since the solution was prepared and poured in a container used for transportation (we used empty one liter water jugs) the day before it was going to be used, it was recommended that the container be identified with its contents (using a permanent marker) and its cover sealed using adhesive tape and be kept out of sunlight until it was ready to be used. The filled container was then stored in the refrigerator until the next day. We stored the container in the refrigerator because we wanted the solution to stay cool so that the solution’s temperature would not differ too much from the water in which the eggs were transported.

Here is the list of equipment used during the preparation of the Ovadine disinfectant and the disinfecting of the equipment:

<table>
<thead>
<tr>
<th>Distilled water (if using municipality or city water)</th>
<th>Ovadine prescription</th>
<th>Permanent marker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty 1 Gallon water jugs</td>
<td>4 Liter beaker</td>
<td>Goggles</td>
</tr>
<tr>
<td>Watch or timer</td>
<td>Measuring cup</td>
<td>Masking tape</td>
</tr>
<tr>
<td>Large garbage bags (1 per incubator)</td>
<td>Stir rod</td>
<td>Industrial sink</td>
</tr>
<tr>
<td>Serving tray</td>
<td>Syringe measure</td>
<td></td>
</tr>
</tbody>
</table>

**Team member’s availability and transportation were confirmed and noted, team members were notified of the time and place to meet; all needed equipment was gathered in TFK office (including a post-it note indicating not to forget the Ovadine solution that was stored in the fridge!); and the owners of the lands on which we were passing through to get to the sites were notified.

**We strongly recommend visiting the established sites a few weeks before incubation day in case some need to be replaces; fallen trees, active beaver dams, bank erosions are all unforeseen factors that may hinder the quality of your sites.**

**Incubation Day**

**Getting the eggs from hatchery**

Prior to spawning, the salmon were set in a mild anesthetic bath for a few minutes. The eggs provided from the female salmons are divided into several separate groups and each group is fertilized with a different male salmon. This is done in order to achieve diverse genetic mixture among the groups of eggs. Water is added to the egg and milk mixture, and is left to sit for a few minutes in order to allow fertilisation to happen.

After sufficient time had passed for fertilisation, the eggs were rinsed with freshwater and the lot of the eggs were placed in wide mouth glass jars for transportation to the incubation sites. It should be noted
that the jars were half-filled with fresh water prior to adding the eggs. The water acted as a cushion for the eggs when they were transferred to the jars. It is best not to hit the eggs on hard surfaces at this point as they are not yet hardened and are still very sensitive. With that being said, we were advised not to place the eggs in the incubators for transportation for this reason. It was judged that it would be best that the eggs move around in the jars as a whole mass rather than being in solitude and hitting against the walls of their individual chamber. The jars were then topped off with fresh water and their lids placed on tightly for the voyage. We were advised to leave the eggs in the water for at least 2 hours before handling them. This allotted time would allow the eggs “water harden”. **Egg mortality before incubation may perhaps be avoided by spawning the females when they are ready; we encountered some mortality in the past and we think those mortalities were perhaps the result from postponing spawning of female salmons that were ready for spawning. The female salmons were left to wait a bit too long before they were actually spawned.

Field Equipment needed for incubation day:

A list of the needed field equipment should be made available for the team members designated to get the equipment ready. The designated members are responsible of gathering the equipment and packing the equipment by following the said list (list in included at the end of the summary).

**Once at the incubation site:**

Several tasks are divided up and assigned to the team members. The team members should keep the same assignments throughout the entire day for the sake of instilling routine and eventually cutting back on time.

The field work may include two segments: the environmental parameter segment and the incubation segment. We decided that the environmental parameter segment would only need to be done whenever a new site would be set-up or whenever significant change would be visible when arriving at the site. Information taken and recorded at each site is: name of team members, date, site code, start and finish time, name of basin, name of water body, site photos, air temperature, longitude and latitude coordinates using a GPS unit, and water parameters using the YSI Professional Plus (Pro Plus) meter. The water parameters recorded at the sites were water temperature, dissolve oxygen, total dissolve solids, pH, and conductivity.

To avoid temperature shock, the first thing we need to do when reaching the site is submerge the Ovadine solution and the transportation jar containing the salmon eggs in the brook. This will allow the temperature of the disinfecting solution and water temperature that the eggs are transported in to become the same as the water temperature in the brook before incubation. It is important to make sure that the jugs are submerged as much as possible so that their contents will acclimate to the water temperature and not the air temperature.

While waiting for the disinfection solution and eggs to be ready for use, other team members should immediately set out to finding the incubation area using the previous reference site photos and GPS coordinates. The team members will also look for the flagging tape that was attached on nearby tree branches and on the rebar; placing flagging tape to determine the placement of the rebar is only effective if installed within a couple weeks of the incubation exercise. If in the
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water too long, the tape darkens in colour and is almost impossible to find when submerged, or even brakes off from the branch and/or rebar, leaving just a small piece to find.

The Ovadine disinfection solution and egg jars are then retrieved from the brook and their temperature verified and recorded. The temperatures are compared with the water temperature in the brook and when they are all conform to one another (and the eggs are left undisturbed in water long enough for hardening), the incubation preparations may begin. The Best Management Practices Bulletin offered by the Ontario Ministry of Natural Resources (OMNR) indicates that the water temperature used during the disinfection process should not change more than 3˚Celsius and direct sunlight should be avoided (5. OMNR, 2009) and the suggested temperature for incubating Atlantic salmon ranges from 7 to 10˚Celsius (6.OMNR, 2009). Oxygen levels and pH levels in the brook are measured, recorded and compared with the recommendations set for freshwater aquatic life by the Canadian Environmental Quality Guidelines. The Recommendations for freshwater aquatic life set by the Canadian Environmental Quality Guidelines indicates that ambient oxygen levels should remain within 5.5 mg/L to 9.5 mg/L (7. CCME 1999), and pH levels should remain within 6.5 to 9.0 (8. CCME 1999). Incubation preparations were successfully accomplished by The Friends of the Kouchibouguacis by using a team of at least three members; one member was used for disinfecting the eggs and filling the loading tray, and two members were used for preparing, filling and installing the incubator. A fourth person is very helpful for fetching fresh water whenever needed, taking photos.

The Ovadine solution (disinfection solution) is poured in the disinfecting container. The lot of the eggs and water are then carefully poured out from the jar into the 600 μm sieve that is sitting in a container of fresh brook water (the brook water acts as a cushion so the eggs would not hit against the disinfecting container). The sieve containing the eggs is then transferred to the disinfecting container and left in the disinfection solution for 10 minutes. The 600 μm sieve of eggs is then transferred to a rinsing container. The sieve is then moved around to assure that the eggs are well rinsed and then transferred again to a container of fresh brook water.

Now that the eggs are disinfected, they are poured from the sieve onto the loading tray. The loading tray is set on top of the container of fresh water. One person pours the eggs from the sieve onto the loading tray and begins pushing the eggs around in order to fill up the compartments of the tray. Once all of the individual compartments of the loading tray are occupied with an egg, all the extra eggs sitting on the tray are wiped off into the fresh water and transferred back to the sieve. Any dead eggs are removed from the loading tray with the use of a plastic (disposable) inoculating wand. Once the loading tray is filled, it is passed onto the other two team members; they will transfer the loading tray to a unit plate (or apartment). A unit plate is added on top of the loading tray. While holding the plate and tray tightly together the designated member flips the pair upside down in order to have the loading tray on top of the plate. As the plate is being filled, another loading tray is being filled at the same time. This method permits the efficient time to remove any dead eggs present in the loading tray before being transferred to the incubator.

Throughout the entire loading process, one person is designated to fetch rinsing water from the brook for the members loading the incubators. The rinsing water is squirted on the bottom of the loading tray in order to dislodge any egg stuck to the tray. The tray is lifted from the incubation
plate and verified for any remaining egg. If eggs are still present in the tray, the tray is placed back on the plate and squirted with fresh water; this is repeated until the loading tray is completely empty. Once the loading tray is empty and the plate is full, another plate is placed on top of the now loaded plate. Next, a rope (used to anchor to the rebar) is passed through the center hole of the incubator unit. The unit is then placed in a container of fresh water with a heavy object (we used a large rock) placed on top of the plates in order to prevent them from floating in the water and separating from one another.

This process is done for the remaining four units (5 pair of plates creating a full condo equal 1000 incubated eggs per site), compiling them one on top of another assuring all apartment are covered with fresh water and passing the bolts through them. Once all the units are filled with eggs, nuts are added to the end of the bolts, assuring that the apartments are tightly clamped together. Ropes are then passed through the holes located on the top side of the plates and fashioned so that the incubator could be attached from the front (upstream side) and from the sides. A pair of 1 inch square steel tubing is then secured at the bottom of the incubation condos with string and rubber tubing (to prevent the string from chafing against the steel tubing). The steel tubing should provide protection to the bottom of the incubator from abrasion against the stream’s substrate and allows water to flow underneath the incubator and avoid sediment build-up around the incubator. The condos are then attached to the rebar rods previously set out in the brook in a manner to best resist the environmental pressures that the winter months might present. **When incubating green eggs, all incubators must be set out well within the 48 hour window allowed for handling green egg without causing harm to the embryos.**

Before leaving the office, water temperature logger devices are launched to “on” mode and programmed to register one reading per hour. The loggers (brand name ONSET) are secured on two of the incubation set-ups; at least two loggers should be used in case one gets lost, or in case incubation sites are located in different parts of the watercourse. The sites used for the installation of loggers are noted in the field booklet. The loggers are secured on one of the anchors low enough to assure that they will be submerged by water at all times; they are secured to the incubators once the all of the field work is done at the site and will be recovered from the gears during the following June, once the incubation period is over. A water temperature data logger form provided by the NB Aquatic Data Warehouse is filled for all sites equipped with data loggers. Fish stocking forms are also filled out for each site. (see Annexe C for Water temperature Data Logger & Fish stocking Form).

Field sheets should be used for the purpose accurately record and store the field data. A quick look at a properly organised field sheet will assure that all the needed information has been collected before leaving the site (see Annexe C for field sheet used by TFK).

The eggs will hatch the following Spring. Once the fry will have used up all of the contents of its yolk sack, the unfed fry will leave the incubator and merge into the water currant and flow a few meters downstream to finally hide within the substrate. The unfed fry will use the substrate as shelter and will start to feed themselves (This is why we aim to find sites that have coble type substrate located downstream). The incubators will be recovered from the brook at the end of the following June. The inventory of eggs left in the incubators will be done, giving us an approximate count of eggs survival for each site. Doing this at the end of June will permit
enough time for all eggs to be hatched and assure we don’t disturb the development of embryos from any possible late hatchers that may still present in the incubators.

References


Annexe A
Summary: Experience gained using Jordan-Scotty Salmonid Egg Incubators, A learning tool June 2016 by The Friends of the Kouchibouguacis
**Site Location:**

try to avoid spring ice flows
avoid areas susceptible to erosion or areas that cause sedimentation
aim for readily accessible
aim for sites that offer a little seclusion from public
use sites with gravelly bottoms suitable for salmon spawning with coble type substrate downstream
take site photos, GPS coordinates and use flagging tape

**Timing:**

Fall months…

You will be using green eggs

- egg are more vulnerable
- must accomplish incubation well within a 48 hour window
- eggs are more vulnerable towards end of 48 hour
  ✓ As backup plan, can store eggs until eyed and incubate during Spring months if needed.

Spring months…

You will be using eyed eggs

- ice and snow may add more challenges
- only backup option may be covering hatchery cost plus fry marking (if necessary)
- hatchery may not have available space to keep unfed fry until large enough for marking
  ✓ eggs are tougher

**Preparing:**

Obtain valid transfer permit and fishing permit
Contact hatchery if needed
Inspect your used incubator
Order incubators if needed
Inspect sites ahead of time in case site is unusable
Install rebar during low water levels
Inspect already set rebar and site marking/reset rebar and add new flagging tape
Order Ovadine solution if needed
Gather volunteer names and contact info. /team members
Contact property owner to ask if OK to pass on their property
**1 female =5000 to 8000 eggs…good to have at least 2 females for genetic diversity.
**1 incubator = 1000 eggs
Figure out back-up plan for excess eggs…verify with DFO if permitted to release unmarked unfed fry in your location
Disinfecting the incubators and loading trays:

- Manufacturer’s recommendation to disinfect fish egg is a 4 part diluted solution (100ppm =10 ml Ovadine™ to 1 litre with clean water ) to one part egg ratio or Mix approximately 10 litres of disinfectant solution for each litre of eggs.
- One 4 Liter jug is quite sufficed for the quantity of eggs and amount of equipment used during a seven incubation unit project (may even be suffice for two years if properly stored).
- Ovadine can be used as a general disinfectant used on different equipment and can also be used as a fish egg disinfectant. It was recommended that we disinfect the incubators prior to using them.
- A 250 part per million Ovadine solution for the disinfection of the incubators and loading trays soaked in the solution for 10 minutes
- Rinse and place as a full condo in large disinfected garbage bags (garbage bag also need to be soaked in the Ovadine solution). Tie off at the top and place in back packs for transportation.

Disinfecting solution used on the eggs:

- A 100part per million Ovadine solution for the disinfection of the salmon eggs.
- Identify with its contents (using a permanent marker) and seal its cover using adhesive tape and keep out of sunlight and refrigerated until it was ready to be used. We store the container in the refrigerator because we wanted the solution to stay cool so that the solution’s temperature would not differ too much from the water in which the eggs were transported.

To obtain Ovadine®:

Distributors in Canada:

West Coast / Canadian Head Office: Syndel Laboratories Ltd
2595 McCullough Rd.
Nanaimo, B.C.
Canada V9S 4M9
Tel: (250) 585-2006 or (800) 663-2282
Fax: (250) 585-5300
E-mail: info@syndel.com
www.syndel.com

East Coast Distributor: GMG Fish Services
14 Magaguadavic Drive
St. George, NB
Canada E5C 3H8
Tel: (506) 755-1387 or (888) 724-4040
Fax: (506) 755-1421
E-mail: gmgretail@cookeaqua.com

Disinfecting of the equipment:

- Distilled water (if using municipality or city water)
- Ovadine prescription
- Empty 1 Gallon water jugs
- 4 Liter beaker
- Watch or timer
- Measuring cup
- Large garbage bags (1 per incubator)
- Stir rod
- Serving tray
- Masking tape
- Industrial sink
- Syringe measure

Getting the eggs from hatchery

Fill transportation jars hallway with fresh water prior to adding the eggs. Once eggs are fertilized, place in wide mouth glass jars for transportation. Top off jars with fresh water and place lids on tightly for the voyage.
**We were advised not to place green eggs in the incubators for transportation; it would be best that the eggs move around in the jars as a whole mass rather than being in solitude and hitting against the walls of their individual chamber.**

**We were advised to leave the eggs the water for at least 2 hours before handling them. This allotted time would allow the eggs “water harden”.**

**Once at the incubation site:**

To avoid temperature shock,:  

-Submerge the Ovadine solution and the transportation jar containing the salmon eggs in the brook…Ovadine = egg water = brook water.

**It is important to make sure that the jugs are submerged as much as possible so that their contents will acclimate to the water temperature and not the air temperature.**

-Immediately set out to finding the incubation area using the previous reference site photos and GPS coordinates. The team members will also look for the flagging tape that was attached on nearby tree branches and on the rebar.

-Retrieve Ovadine solution and egg jars are then from the brook and verify temperature and record.

**The temperatures are compared with the water temperature in the brook and when they are all conform to one another (and the eggs are left undisturbed in water long enough for hardening), the incubation preparations may begin.**

**Water temperature used during the disinfection process should not change more than 3˚Celsius and direct sunlight should be avoided and the suggested temperature for incubating Atlantic salmon ranges from 7 to 10˚Celsius.**

**Oxygen levels and pH levels in the brook are measured, recorded and compared with the recommendations set for freshwater aquatic life by the Canadian Environmental Quality Guidelines. Ambient oxygen levels should remain within 5.5 mg/L to 9.5 mg/L and pH levels should remain within 6.5 to 9.0.**

**Team of at least three members:**

One for disinfecting the eggs and filling the loading tray,  
Two members for preparing, filling and installing the incubator.  
One for fetching fresh water whenever needed, taking photos.

**The team members should keep the same assignments throughout the entire day for the sake of instilling routine and eventually cutting back on time.**

**Environmental parameter segment would only need to be done whenever a new site would be set-up or whenever significant change would be visible when arriving at the site.**
**Information taken and recorded at each site is name of team members, date, site code, start and finish
time, name of basin, name of water body, site photos, air temperature, longitude and latitude coordinates
using a GPS unit, and water parameters using the YSI Professional Plus (Pro Plus) meter.

**The water parameters recorded at the sites were water temperature, dissolve oxygen, total dissolve
solids, pH, and conductivity.

**Desinfecting the eggs:**

- The Ovadine solution (disinfection solution) is poured in the disinfecting container.
- The lot of the eggs and water are then carefully poured out from the jar into the 600 μm sieve that is
  sitting in a container of fresh brook water (the brook water acts as a cushion so the eggs would not hit
  against the disinfecting container).
- The sieve containing the eggs is then transferred to the disinfecting container and left in the disinfection
  solution for 10 minutes.
- The 600 μm sieve of eggs is then transferred to a rinsing container. The sieve is then moved around to
  assure that the eggs are well rinsed and then transferred again to a container of fresh brook water.

**Loading trays and incubators:**

- Pour eggs from the sieve onto the loading tray. The loading tray is set on top of the container of fresh
  water. One person pours the eggs from the sieve onto the loading tray and begins pushing the eggs
  around in order to fill up the compartments of the tray.
- All the extra eggs sitting on the tray are wiped off into the fresh water and transferred back to the sieve.
- Any dead eggs are removed from the loading tray with the use of a plastic (disposable) inoculating
  wand.
- Pass loaded tray to team members responsible in filling unit plate. A unit plate is added on top of the
  loading tray. While holding the plate and tray tightly together the designated member flips the pair
  upside down in order to have the loading tray on top of the plate.
- As the incubator is being filled, another loading tray is being filled.
- Throughout the entire loading process, one person is designated to fetch rinsing water from the brook
  for the members loading the incubators. The rinsing water is squirted on the bottom of the loading tray
  in order to dislodge any egg stuck to the tray.
- The tray is lifted from the incubation plate and verified for any remaining egg. If eggs are still present
  in the tray, the tray is placed back on the plate and squirted with fresh water; this is repeated until the
  loading tray is completely empty.
- Place another plate on top of the now loaded plate.
- Pass a rope through the center hole of the incubator unit. The unit is then placed in a container of fresh
  water and hold down with a heavy object (we used a large rock).
- Continue for the remaining four units (5 pair of plates creating a full condo equal 1000 incubated eggs
  per site), compiling them one on top of another assuring all apartment are covered with fresh water and
  passing the bolts through them.
- Once all the units are filled with eggs, nuts are added to the end of the bolts, assuring that the
  apartments are tightly clamped together. Ropes are then passed through the holes located on the top side
of the plates and fashioned so that the incubator could be attached from the front (upstream side) and from the sides.
-A pair of 1 inch square steel tubing is then secured at the bottom of the incubation condos with string and rubber tubing (to prevent the string from chafing against the steel tubing).
-The condos are then attached to the rebar rods previously set out in the brook in a manner to best resist the environmental pressures that the winter months might present.

**When incubating green eggs, all incubators must be set out well within the 48 hour window allowed for handling green egg without causing harm to the embryos.**

-Secured Water temperature data loggers on two of the incubation set-ups.
-The sites used for the installation of data loggers are noted in the field booklet. The temperature data loggers are secured on one of the anchors low enough to assure that they will be submerged by water at all times.
-A water temperature data logger form provided by the NB Aquatic Data Warehouse is filled for all sites equipped with data loggers.
-Fish stocking forms are also filled out for each site.

Field sheets should be used for the purpose accurately record and store the field data. A quick look at a properly organised field sheet will assure that all the needed information has been collected before leaving the site.

The eggs will hatch the following Spring. Once the fry will have used up all of the contents of its yolk sack, the unfed fry will leave the incubator and merge into the water currant and flow a few meters downstream to finally hide within the substrate. The unfed fry will use the substrate as shelter and will start to feed themselves. The incubators will be recovered from the brook at the end of the following June. The inventory of eggs left in the incubators will be done giving us an approximate count of eggs survival for each site. Doing this at the end of June will permit enough time for all eggs to be hatched and assure we don’t disturb the development of embryos from any possible late hatchers that may still present in the incubators.

**Dead egg counts:**
Counting the dead eggs left inside the units will give us an approximate value on the survival ratio for this type of stocking. It should be noted that all dead eggs are removed as the plates are being filled. The crew assigned for filling up the plates may simply use an inoculating wand to remove any visible dead egg prior to assembling and installing the units.

**Field Equipment needed for incubation day:**
A list of the needed field equipment should be made available for the designated team members. The designated members are responsible of gathering the equipment and packing the equipment by following the said list (see following page for list).
Field Equipment needed for incubation day:

- Rebar
- Field measuring tape
- Meter stick
- Salmon eggs transfer permit
- Empty Incubators (pre-disinfected with Ovadine) stored in garbage bags
- Nuts & bolts + extras
- Rope (3 sections/ units) + extras
- 2 loading trays
- 2 White plastic tubs
- 2 Grey “Rubbermaid” tubs
- Ovadine solution 100ppm
- Field book + Field sheets
- Pencils
- Sledgehammer
- Camera
- GPS
- MSD sheets
- Watch
- Pencil sharpener
- Goggles
- Extra batteries for YSI
- Extra batteries for digital camera
- Extra batteries for GPS
- Calculator
- 600 μm sieve
- Squirt bottles (Gatorade bottles)
- Site reference photos
- Ovadine prescription
- YSI
- Thermometer
- Stopwatch
- Data logger
- Water temp. data logger form
- Fish stocking form
- Clipboard
- Flagging Tape
- 3 Backpacks
- Salmon eggs in large water filled jar
- Vinyl gloves
- Rubber gloves (elbow length)
- Chest waders
- Knife
- Lighter
- Inoculating wands
- Cell phone
- First Aid Kit
Annexe B
For use by everyone who is interested in enhancing salmon and other fish runs in any stream, river or lake. Perfect for streamkeeper groups, research applications and education projects.

**Purpose**

The critical need to enhance our salmon stocks is well documented. Natural spawning has declined dramatically over the past 50 years for many reasons. Many of our spawning areas no longer exist. Many spawning areas that still exist are only partially effective and many of our original salmon stocks are now extinct. The need for increased salmon enhancement programs by volunteers has never been greater. The availability of the Jordan-Scotty Incubator, as a simple yet effective incubation unit, can be of great help for our precious salmon stocks and their eventual recovery.

The development of the Jordan-Scotty Incubator is the direct result of the desire by Scott Plastics Ltd to make a contribution to the enhancement of salmon and trout stocks in the streams and creeks around the world. Over the years, due to Man’s intervention, these habitats have lost their natural spawning and rearing capabilities. At Scotty, we hope that our efforts will assist bringing the fish back. With your help, we can see to it that future generations will be able to watch fish return to streams and rivers in historic quantities.

**HBSC Donation**

HSBC generously donated $20,000 to support the free distribution of the Jordan/Scotty Salmonid Incubators for education and community salmon enhancement, stewardship or stream keeper groups. Scott Plastics would like to thank HSBC for their support and commitment for a successful return to healthy rivers and streams. HSBC Donation Funds are still available and any education and community Salmon enhancement groups in Canada may apply. (Pacific Salmon Foundation continues to manage the funds). However, please contact Scott Plastics for information.

**History and Design**

The original Incubator prototype was designed and tested by Mr. Fred Jordan, a Salmonid Technician for many years. He conceived this idea for stream enhancement during the 1980’s. The success of his early experiments with this unit led to research, development and further design of the incubator by Scott Plastics Ltd of Sidney, BC. This modern unit is extremely efficient and very compact. It is simple to use, durable, cost effective and practical, making it an excellent addition to Salmonid enhancement projects.

The Jordan/Scotty Incubator is a scientifically designed and tested plastic incubation unit and was developed to provide an efficient aid in the stream incubating of salmon or trout eggs. The unique design either eliminates or minimizes most of the problems experienced by natural spawning. Fungus infection is virtually eliminated and eggs are protected from predators and silt suffocation. Testing and usage
indicates that survival rates from egg to fry is often better than 65 - 95% as compared to natural spawning survival rates of between 5% - 20%.

In nature, high egg loss rates can be caused by poor fertilization when deposited, eggs not being successfully buried, fungus from dead eggs spreading to healthy eggs, attrition by predators, and silt suffocation. The Jordan-Scotty incubator addresses these issues and others. Egg quality can be checked during the loading process and all eggs are fertilized before loading. Eggs are quarantined from each other during development, limiting the spread of disease and fungal infection. Eggs are safe from predators and alevin are safely contained until their yolk sac has been absorbed, increasing survival rates.

**How it Works**

A pair of loaded plates are bolted together to create a “unit” designed to hold 200 single eggs or more, depending on species and size of egg. The plates are held together by nylon tie bolts and stainless steel nuts and can be grouped in up to 5 unit sets. Escape holes allow the hatched fry to swim free once they have developed in their protected environment. The assembled egg units are anchored in streams by securing them to re-bar stakes or some other permanent holders. Incubator plates are available with three sizes of escape hole, use to be determined using below chart.

<table>
<thead>
<tr>
<th>Species</th>
<th>Egg Size (Average)</th>
<th>Recommended Plate Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook/King salmon</td>
<td>8.0–12.0 mm</td>
<td>Green</td>
</tr>
<tr>
<td>Chum/Dog salmon</td>
<td>8.0 mm</td>
<td>Green/Red</td>
</tr>
<tr>
<td>Brown Trout</td>
<td>4.0-5.0 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Coho</td>
<td>7.0 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Eastern Trout</td>
<td>4.5 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Pink salmon</td>
<td>6.8 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>5.2 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Sockeye</td>
<td>6.0 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Steelhead</td>
<td>5.2 mm</td>
<td>Red</td>
</tr>
<tr>
<td>Walleye</td>
<td>2.5 mm</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

HINT: A pair of Coho salmon will provide between 2000 and 2500 eggs, which can be accommodated in two of these 5 unit packs.
Loading the Incubator

Incubators are intended for use with “Green” or “Eyed” eggs.

A loading tray will help to load the incubator so that each cell is filled and with the least damage to eggs in the process.

1. Place fertilized eggs into a water-filled basin.
2. Lower loading tray into basin of eggs.
3. Allow eggs to cover loading tray and lift gently to fill each cell with one egg.
4. Gently brush off surplus eggs. Remove or replace unhealthy or damaged eggs.
5. Place an empty incubator plate over loader plate and invert the two plates to transfer the eggs to the incubator plate.
6. Remove the empty loading tray and check that all cells are filled.
7. Top with second incubator plate and secure together with nylon tie bolt and stainless nuts.
8. Incubator units can be placed as singles or in groups of up to 5. Simply cut tie bolts where appropriate and secure with extra nuts.

Placing the Incubator

1. Units must be placed in stream gravel so that they are continually covered by a flow of water passing through gravel and cells.
2. Submerge units so that hole tabs of the units are on top, ensuring that the escape holes are at the bottom of the cells so that sand particles wash right through the compartment and silt does not build up to block cells.

Flow of Water

Side view of 10 Incubator plates (holding 1000 eggs) placed upright in gravel.
3. Escape holes should also face the water flow to ensure the maximum amount of oxygen rich water to flow through the unit.

4. Incubators should be securely anchored to ensure that they remain in position. Avoid areas subject to flash flooding. A good location is downstream from a large boulder. You can also attach the unit to a section of embedded re-bar to help hold in place.

5. Completely cover the units with 3 inches of gravel to help anchor and to protect the units and fry once they escape. Discretely mark or record location to assist in recovery of units.

6. Incubator must be at a depth where it will be covered with water at all times. Be aware of the possible/likely depth changes in your location.

Care and Maintenance in Location

If possible, incubators should be located in places where they are protected from vandalism or curiosity. During the incubation period, the incubators should be checked regularly to ensure that:

1. They remain in position.
2. They are free of debris.
3. They are covered with a continuous flow of water.

Note: Do Not Disturb or open the units until all the fry have escaped. Check with your egg provider for approximate length of incubation for the egg species used.

An underwater camera shows the incubator placed among large rocks.
Checking your Results/
Removing Incubator

When removing the incubator, care should be taken to disturb the gravel as little as possible, as this is where the fry are hiding.

Once removed, the incubator can be opened to reveal the success of the hatch rate. Wash incubators thoroughly and dry before storage. Store in a dark, dry place. With proper care, the Jordan/Scotty Incubator units can be used season after season.

If possible, please submit results of your project to your local Fisheries Dept or hatchery. As well, Scott Plastics Ltd would appreciate any information or report you can provide in order to log success rates and use of these units.

Classroom Applications

Clear incubator plates are available for classroom or similar applications. These allow for viewing of eggs throughout incubation period and are a helpful tool in many educational projects.

Chris Robinson, the O.F.A.H. Atlantic Salmon Restoration Program Coordinator notes “each hatchery gets 100 eggs in January, and the resulting fry are released by the students in May into one of our three target tributaries for Atlantic salmon restoration in Lake Ontario. The students enjoy watching the eggs hatch into alevin in their clear-plastic “condos”. Over 800 students this year will directly be involved, but in many schools multiple classes participate, so the number is much higher.”

Incubator Tray above showing the mortality and survival rate within two weeks.
Where and When to Obtain Eggs

Contact your local Dept of Fisheries & Oceans or similar agency. In Canada, contact the DFO Community Advisor. The disposition of salmonid eggs is carefully supervised and controlled by DFO to ensure that all enhancement activities meet area requirements and conform to department standards.

Protocols regarding the transfer of eggs must be approved by the federal-provincial Introductions and Transfers Committee. In British Columbia, a list of the community advisors in your area can be obtained by contacting the Habitat Enhancement Branch:

Department of Fisheries & Oceans
Community Involvement
Habitat Enhancement Branch
400-555 West Hastings Street
Vancouver BC
Canada, V6B 5G3
P: 604-666-6614
F: 604-666-0292

How to Obtain Jordan/Scotty Incubators

The development of the Jordan/Scotty Incubator is the direct result of the desire of Scott Plastics Ltd to make a contribution to the enhancement of salmon stocks in the large number of streams and creeks of BC, and elsewhere in the world. To date, the entire cost of research and development of the Jordan/Scotty Incubator has been borne by Scott Plastics Ltd. These units are available at a nominal price to cover minimum raw materials and labour costs. Incubators can be purchased from:

Scott Plastics Ltd
2065 Henry Ave West
Sidney, BC, Canada
V8L 5Z6
P: 250-656-8102
F: 250-656-8126
E: incubator@scotty.com

Please state the name and intention of your organization and include full contact information.
“We have been using Scotty Incubators since 2003 and we absolutely love them. We use the incubators for lake trout studies as well as for increased lake trout survival and egg relocation.”

Nadine Thebeau, Ontario Ministry of Natural Resources, Red Lake District

“The new style of easy loader trays was amazing! Last time it took us 3 hours to do 6000 eggs. We did 10,000 in 45 minutes this year! A great time savings.”

Wayne Sheridan, Canadian Angling, Upper Saugeen Habitat Restoration Association

“...we are excited by the hatch rates achieved and feel confident that the use of Scotty incubators will continue to play a major part in the replacement of the salmon runs in our major South Island rivers.”

Pam Ellis, New Zealand Salmon Anglers Association Inc, Christchurch, New Zealand.
Annexe C
Ovadine™ is exclusively distributed for fish culture by Syndel Laboratories Ltd in Canada and Western Chemical Inc in the USA

Ovadine™ is an easy to use, environmentally friendly, general disinfectant.

Ovadine™ is a specially buffered, non-staining, non-corrosive, aqueous iodine solution used by fish and shrimp farm personnel as a general disinfectant on equipment, tanks, nets, hands and clothing in hatcheries and at farm sites. Ovadine™ may also be used to disinfect fish and shrimp eggs and shrimp nauplii.

Ovadine™ is a fast acting disinfectant that has been shown to be effective against many gram-positive and gram-negative bacteria and fungi.

**Recommended Dosage & Administration Method**

**General Disinfectant**
- A 250 ppm available iodine solution is made by diluting 25 ml Ovadine™ to 1 litre with clean water. Use as a dip or bath.
- Wash items that are heavily contaminated with soil or organic debris before disinfecting with Ovadine™.
- A change in the solution colour from dark brown to light yellow indicates loss of activity. Ideally, the free iodine concentration should be monitored during treatment. Renew by using a fresh solution of Ovadine™.

**Fish Egg Disinfectant**
- Conditions such as the organic content of water and the mass of the fish eggs vary, thus the number of eggs treated can vary widely.
- Place eggs into a 100 ppm free iodine solution of Ovadine™ for ten minutes. A suitable ratio is 1 volume of eggs to 4 volumes of this solution.
- A 100 ppm free iodine solution is made by diluting 10 ml Ovadine™ to 1 litre with clean water.

**Presentation**
- Ovadine™ is a liquid available in 4 litre, 20 litre and 200 litre containers.

**Composition**
- Ovadine™ is a buffered 10% polyvinylpyrrolidone iodine (PVPI) solution in water. The dark brown liquid contains minimum 1% available iodine.

**Stability and Storage**
- PVPI solutions may be stored at room temperature (20-30°C) for periods greater than two years if containers are kept tightly closed and away from direct sunlight.
Safety Precautions

- PVPI solutions have very low toxicities and are non-irritating to skin, mucosa and wounds. PVPI solutions are classified as practically non-toxic to humans. There is no evidence of adverse effects from continued use of PVPI solutions.

- Care should be taken when discarding PVPI solutions. For weak solutions, dilute with several volumes of water before discarding.

- For strong solutions, neutralize with sodium thiosulfate before discarding.

- Ovadine™ has low toxicity to fish eggs. However, it may be toxic to fish. Therefore, thoroughly rinse all disinfected surfaces before re-use.

- The 100 ppm free iodine solution may be painted on lesions, although it may burn the exposed skin of some marine fish and smooth skinned fish.
MATERIAL SAFETY DATA SHEET

OVADINE

Section I - IDENTIFICATION

PRODUCT: Ovadine

SYNONYMS: Povidone Iodine solution

Section II - HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
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<th>%</th>
<th>TLV</th>
<th>HAZARD</th>
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<tbody>
<tr>
<td>Povidone Iodine</td>
<td>10-12%</td>
<td>n. av.</td>
<td>none known</td>
</tr>
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Section III - HEALTH & FIRST AID INFORMATION

INHALATION: There is no evidence of adverse effects from inhalation of povidone iodine solutions.

INGESTION: There is no evidence of adverse effects in rats that received up to 30 mg/kg/week for 12 weeks of 10% povidone iodine solutions. The possibility exists that in certain individuals povidone iodine solutions may cause diarrhea or intestinal problems.

EYE CONTACT: There is no evidence of eye irritation from contact with povidone iodine solutions. If contact does occur the eye should be flushed with water.

SKIN CONTACT: There is no evidence of skin irritation either for intact or abraded skin from contact with povidone iodine solutions. If contact does occur the affected area should be flushed with water.

OTHER HEALTH INFORMATION: LD50 36.16 ml/kg orally in female and male rats. This is for 10% aqueous povidone iodine solutions with lower and upper limits of 29.13 ml/kg and 46.99 ml/kg. This compound is classified as practically non-toxic as a 10% aqueous solution.
Section IV - PHYSICAL DATA

SOLUBILITY IN WATER: completely miscible

APPEARANCE AND ODOR: dark reddish brown liquid with slight iodine-like odour

pH: 6.5 - 7.5

SPECIFIC GRAVITY: 1.02 - 1.04

AVAILABLE IODINE: 0.97% - 1.07%

Section V - FIRE AND EXPLOSION HAZARDS

FLASH POINT & METHODS USED: none

FLAMMABLE LIMITS IN AIR; % BY VOL. LOWER: none

FLAMMABLE LIMITS IN AIR; % BY VOL. UPPER: none

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS: none

UNUSUAL FIRE & EXPLOSION HAZARDS: none

Section VI - REACTIVITY

STABILITY: stable

HAZARDOUS POLYMERIZATION: will not occur

CONDITIONS & MATERIALS TO AVOID: heat causes decrease in available iodine

HAZARDOUS DECOMPOSITION PRODUCTS: may produce iodine vapours

Section VII - EMPLOYEE PROTECTION

CONTROL MEASURES: Iodine may be neutralized with sodium thiosulfate.

RESPIRATORY PROTECTION: Use with adequate ventilation.
PROTECTIVE CLOTHING: Wear gloves and protective clothing when using this product.

EYE PROTECTION: Wear eye protection when handling this product.

Section VIII - ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS: Ensure that any leaks or spills are cleaned up.

SPILL OR LEAK PRECAUTIONS: Do not allow to flow into water supplies. Absorb any leaked material or neutralize with sodium thiosulfate.

WASTE DISPOSAL: May usually be disposed of in landfill. Seek the advice of a professional disposal service. Ensure disposal method complies with local, provincial and federal regulations governing disposal.

Section IX - REGULATORY CONTROLS


OTHER REGULATORY REQUIREMENT: none

Section X - PRECAUTIONS: HANDLING, STORAGE & USAGE

Store in a cool place away from direct light in a tightly closed container.

PREPARED BY: MSDS Dept. DATE: Update December 20, 2010
MATERIAL SAFETY DATA SHEET

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FLAMMABLE LIMITS IN AIR; % BY VOL. UPPER: none

SPECIAL FIRE FIGHTING PROCEDURES & PRECAUTIONS: none

UNUSUAL FIRE & EXPLOSION HAZARDS: none

Section VI - REACTIVITY

STABILITY: stable

HAZARDOUS POLYMERIZATION: will not occur

CONDITIONS & MATERIALS TO AVOID: heat causes decrease in available iodine

HAZARDOUS DECOMPOSITION PRODUCTS: may produce iodine vapours

Section VII - EMPLOYEE PROTECTION

CONTROL MEASURES: Iodine may be neutralized with sodium thiosulfate.

RESPIRATORY PROTECTION: Use with adequate ventilation.
PROTECTIVE CLOTHING: Wear gloves and protective clothing when using this product.

EYE PROTECTION: Wear eye protection when handling this product.

Section VIII - ENVIRONMENTAL PROTECTION

ENVIRONMENTAL PRECAUTIONS: Ensure that any leaks or spills are cleaned up.

SPILL OR LEAK PRECAUTIONS: Do not allow to flow into water supplies. Absorb any leaked material or neutralize with sodium thiosulfate.

WASTE DISPOSAL: May usually be disposed of in landfill. Seek the advice of a professional disposal service. Ensure disposal method complies with local, provincial and federal regulations governing disposal.

Section IX - REGULATORY CONTROLS


OTHER REGULATORY REQUIREMENT: none

Section X - PRECAUTIONS: HANDLING, STORAGE & USAGE

Store in a cool place away from direct light in a tightly closed container.

PREPARED BY: MSDS Dept. DATE: Update December 20, 2010
Annexe D
**WATER TEMPERATURE DATA LOGGER FORM**

**Data Logger ID#:** __________

**Data File Name:** __________

**Water Name:** __________

**Tributary To:** __________

**Site ID#:** __________

**Site Name:** __________

**Agency:** __________

**Personnel:** __________

**Did you do this work with another agency?**

*(If “Yes”, complete two fields below):*  
☐ Yes  ☐ No

**2nd Agency:** __________

**Contact:** __________

**Site Location Description / Directions:**

**START AND END DATES:**

<table>
<thead>
<tr>
<th>Date (yyyy/mm/dd)</th>
<th>Time of Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Logger Installed in Water:</td>
<td></td>
</tr>
<tr>
<td>Data Logger Removed from Water:</td>
<td></td>
</tr>
<tr>
<td>Date of First 24 Hrs of Recordings:</td>
<td></td>
</tr>
<tr>
<td>Date of Last 24 Hrs of Recordings:</td>
<td></td>
</tr>
</tbody>
</table>

**DATA LOGGER PLACEMENT:**

**Distance from Shore (m):** __________

**Water Depth (cm):** __________

**SAMPLING TIME INTERVAL:**

**Temperature Recorded Every:** __________ minutes

**Sketch of Site and Data Logger Placement:**

**SITE COORDINATES:**

**GPS Waypoint ID#:** __________

**Coordinates:**

- x / long. __________ ? __________ m
- y / lat. __________ ? __________ m

**Datum:** (WGS84 or NAD83)

**WATER MEASUREMENTS:**

<table>
<thead>
<tr>
<th>Temperature (°C):</th>
<th>Water</th>
<th>Air</th>
<th>Time of Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>(using hand-held thermometer)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At Installation:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At Removal:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Water Level:**

- At Installation:  
  - Very High  
  - High  
  - Normal  
  - Low  
  - Very Low  
  - Dry  

- At Removal:  
  - Very High  
  - High  
  - Normal  
  - Low  
  - Very Low  
  - Dry

**Photographs taken**

☐ Yes *(If “Yes”, list photo file names and add photo numbers to sketch with arrows indicating direction of camera):*  
☐ No

**WATER MEASUREMENTS:**

**Sketch of Site and Data Logger Placement:**

**DATA LOGGER DETAILS:**

- **Brand Name:** __________
- **Model:** __________
- **Resolution:** __________
- **Accuracy:** __________
- **Recording Options:**  
  - Temperature Only
  - Temperature and Depth
  - Other (specify):

**SITE DETAILS:**

- **Water ID:** __________
- **Drainage Code:** __________
- **NB Atlas:**  
  - Page No __________  
  - Tile No __________
- **First time sampling this site for temperature:**  
  - Yes  
  - No

**Water Temperature Recorder Site Form 2006-05-10**

**Other forms used**

- ☐ Habitat Survey  
- ☐ Stocking  
- ☐ Other (specify):

---

*NB Aquatic Resources Data Warehouse / NB Department of Natural Resources and Energy / NB Wildlife Council*
**FISH STOCKING FORM**

* * * * * * * * * * * * * * * * * * * * * * *

**TO BE COMPLETED IN THE FIELD**

**TO BE COMPLETED IN THE FIELD**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB I&amp;T Licence #:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Stocking Date (yyyy-mm-dd):</td>
<td>___________________________</td>
</tr>
<tr>
<td>Agency:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Personnel:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Water Name:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Tributary to:</td>
<td>___________________________</td>
</tr>
<tr>
<td>County:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Site ID#:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Site Name:</td>
<td>___________________________</td>
</tr>
</tbody>
</table>

**SITE COORDINATES:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Waypoint ID#:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Coordinates: x / long.</td>
<td>_______ ? ______ m</td>
</tr>
<tr>
<td>y / lat.</td>
<td>_______ ? ______ m</td>
</tr>
<tr>
<td>Datum: (e.g., NAD83)</td>
<td>___________________________</td>
</tr>
</tbody>
</table>

**DETAILS OF STOCKED FISH:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Stock or Strain:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Hatchery:</td>
<td>___________________________</td>
</tr>
</tbody>
</table>

**SITE DETAILS:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water ID:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Drainage Code:</td>
<td>___________________________</td>
</tr>
<tr>
<td>NB Atlas:</td>
<td>Page No _______ Tile No _______</td>
</tr>
</tbody>
</table>

**WATER MEASUREMENTS:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C):</td>
<td>Water Air Time of Day</td>
</tr>
<tr>
<td>Water Level:</td>
<td>Very High Low High Normal Very Low</td>
</tr>
</tbody>
</table>

**COMMENTS:**

* * * * * * * * * * * * * * * * * * * * * * *

**SITE DETAILS:**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species Code:</td>
<td>___________________________</td>
</tr>
<tr>
<td>Strain Code:</td>
<td>___________________________</td>
</tr>
</tbody>
</table>

**Other forms used at this site:**
- Habitat Survey
- Electrofishing
- Thermistor

**Species Code:**

**Strain Code:**

Fish Stocking Form – 2006-05-10

**NB Aquatic Resources Data Warehouse / NB Department of Natural Resources and Energy / NB Wildlife Council**
## FISH STOCKING FORM CODES

### Mark Type Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Mark Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC</td>
<td>Adipose Clip</td>
</tr>
<tr>
<td>LPC</td>
<td>Left Pectoral Clip</td>
</tr>
<tr>
<td>RPC</td>
<td>Right Pectoral Clip</td>
</tr>
<tr>
<td>LVC</td>
<td>Left Ventral Clip</td>
</tr>
<tr>
<td>RVC</td>
<td>Right Ventral Clip</td>
</tr>
<tr>
<td>BVC</td>
<td>Both Ventral Clip</td>
</tr>
<tr>
<td>ANC</td>
<td>Anal Clip</td>
</tr>
<tr>
<td>UCC</td>
<td>Upper Caudal Clip</td>
</tr>
<tr>
<td>LCC</td>
<td>Lower Caudal Clip</td>
</tr>
<tr>
<td>DOC</td>
<td>Dorsal Clip</td>
</tr>
<tr>
<td>ADP</td>
<td>Adipose Punch</td>
</tr>
<tr>
<td>UCP</td>
<td>Upper Caudal Punch</td>
</tr>
<tr>
<td>LCP</td>
<td>Lower Caudal Punch</td>
</tr>
<tr>
<td>BRA</td>
<td>Brand</td>
</tr>
<tr>
<td>OTM</td>
<td>Other Mark</td>
</tr>
</tbody>
</table>

### Tag Type Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Tag Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT</td>
<td>Carlin Tag</td>
</tr>
<tr>
<td>JAT</td>
<td>Jaw Tag</td>
</tr>
<tr>
<td>SPT</td>
<td>Spaghetti Tag</td>
</tr>
<tr>
<td>STT</td>
<td>Strap Tag</td>
</tr>
<tr>
<td>VTT</td>
<td>Vinyl Tubing Tag</td>
</tr>
<tr>
<td>ANT</td>
<td>Anchor Tag</td>
</tr>
<tr>
<td>DAT</td>
<td>Dart Tag</td>
</tr>
<tr>
<td>PDT</td>
<td>Petersen Disc Tag</td>
</tr>
<tr>
<td>PIT</td>
<td>Passive Integrated Transponder (PIT) Tag</td>
</tr>
<tr>
<td>RTT</td>
<td>Radio Transmitter Tag</td>
</tr>
<tr>
<td>OTT</td>
<td>Other Tag</td>
</tr>
</tbody>
</table>
Annexe E
Jordan-Scotty incubator installation form

Agency: ______________________ Date (yyyy-mm-dd): __________ Site ID #:________
Personnel: _________________________________________________________________
Water name: _________________ Tributary to: _________________________________
Site Coordinates: X / long ___________________ Y / lat ___________________
Species: _______________________ Air Ten(°C):________
Time start: __________ Time Finish: __________

<table>
<thead>
<tr>
<th>watercourse</th>
<th>disinfectant</th>
<th>eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water temp (°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissolved oxygen (% , mg/L)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Is this a new site? ____Yes ____ No
Was an environmental survey form completed for this site? ____Yes ____ No
(Please state reason for completing environmental survey in comments)
Was a temperature logger installed at this site?  ____ Yes  ____ No
Was a water temperature data logger form completed?  ____ Yes  ____ No

Was a fish stocking form completed? ____ Yes  ____ No
Site photos:  ____ field sheet  ____ upstream  ____ downstream
 ____ across  ____ substrate

Comments:

Reminder:
**Ambient oxygen levels should remain within 5.5 mg/L to 9.5 mg/L
**pH levels should remain within 6.5 to 9.0.
**Water temperature used during the disinfection process should not change more than
3°Celsius and direct sunlight should be avoided.

Les Ami(e)s de la Kouchibouguacis Inc.  Friends of the Kouchibouguacis Inc.