

**ARTIFICIAL NESTING STRUCTURE USE AND MAINTENANCE**  
**PROJECT # PF15 – W16**

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**PREPARED FOR:**

**FISH & WILDLIFE COMPENSATION PROGRAM – PEACE**

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## **EXECUTIVE SUMMARY**

The Peace Fish and Wildlife Compensation Program (FWCP-Peace), formerly Peace/Williston Fish and Wildlife Compensation Program, have conducted successful enhancements for waterfowl and aquatic furbearers in the Parsnip River drainage since 1991. Enhancement activities have included establishing water-control structures to conserve entire wetlands, and placing artificial nesting structures to supplement waterfowl nesting habitat.

The artificial nesting structure use and maintenance project in 2014 is the continuation of the 3 year maintenance activities of nest boxes and floating islands, of which the last maintenance period occurred in 2011. This is part of the long term initiative by FWCP-Peace in which maintenance activity of waterfowl structures occur every 3 years with the objective to ensure waterfowl nesting structures are functioning. The 2014 maintenance activities and report will determine the future direction and management of the waterfowl structure program between stakeholders and Fish & Wildlife Compensation Program.

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## 1.0 INTRODUCTION

In 1989, the Peace Williston Fish and Wildlife Compensation Program (hereafter referred to by its current name the Peace Fish and Wildlife Compensation Program FWCP-Peace) was created to enhance and protect fish and wildlife resources impacted by the construction of the Peace River hydroelectric projects (WAC Bennett and Peace Canyon dams and the subsequent impoundment of Williston and Dinosaur Reservoirs). One of the initial impacts of concern was the loss of waterfowl and other wetland-nesting bird habitat, and in 1991, FWCP-Peace staff completed inventory and assessment of several wetlands along the southern reach of Williston Reservoir. This study identified several locations suitable for habitat enhancement and suggested site-specific habitat improvement techniques (Corbould 1991). Following this initial assessment, 70 enhancement structures were installed at 17 sites along the southern end of Williston Reservoir and the Crooked River between 1991 and 1998 (see Figure 1, References) (Juelfs and Corbould 2008). These included floating platforms to provide stable nesting and loafing sites during times of water fluctuation, nest boxes to provide protected and cavity nesting sites, and nesting tunnels to provide ground nesting habitat in conjunction with control structure to limit the water fluctuation (Clark 2000; Corbould 1991a, 1992, 1993; Hengeveld and Corbould 1998; Martin 1992).

In addition to creating these nest enhancement sites, the FWCP-PEACE recognized the importance of monitoring their use, and as necessary, maintaining and replacing structures. Numerous monitoring and maintenance activities were undertaken between 1991 and 2011; however not all years were they well documented (Corbould pers comm). In 2008, a report summarized the use and maintenance of nesting structures from 1992-2006 (Juelfs and Corbould 2008). This report found that overall, the nesting structure program was successful and made a number of general and site-specific conclusions and recommendations including:

### General

- *Monitor and maintain nesting structures every 3 years. This is consistent with the standard Ducks Unlimited Canada practice to ensure nesting use and continue the functional longevity of the structures.*
- *Remove previous nesting material and replace wood shavings to maximize likelihood of use and nesting productivity.*

- *To increase the lifespan of partially submerged islands, consider removing some soil and vegetative material to improve floatation. Otherwise, replace with platforms or logs to maintain loafing sites if this habitat is still limiting in the particular area.*
- *Plan to replace nest boxes and floating islands when structures have reached 7-10 years of age.*

### Nest boxes

- *Sites at Dina and Kerry Lakes have low waterfowl use. Consider moving or eliminating these structures.*
- *Although several nest boxes at Rocky Marsh had no waterfowl use, maintain these boxes for educational and public viewing purposes.*
- *Establish additional nest boxes adjacent to high use sites at 60 Km Marsh, Mugaha A, and Old Mill Pond.*
- *Establish nest boxes at additional sites along the Crooked River to benefit cavity nesting waterfowl and provide public viewing opportunities.*

### Floating platforms

- *Establish 1 or more floating platforms in the 15 Mile Swamp area to provide nesting sites trumpeter swans. Structure design needs to consider specific habitat requirements of these larger birds.*

### Nesting tunnels

- *Monitor nesting tunnels at Rocky Marsh for another session, and if no notable use occurs, remove these structures.*
- *Replacing the grassy material between the wire-mesh layers on nesting tunnels is difficult in the field. Design of future tunnels should consider this limitation.*

## **2.0 GOALS AND OBJECTIVES**

Short term goals and objectives are to re-locate and re-identify all structures, mapping locations, and the integrity of those structures along with confirmation of species using the artificial nesting

structures. Long term measures of success include the continual use of the structures by waterfowl and increasing public awareness about the importance of wetland habitat in the area.

### **3.0 STUDY AREA**

The study area encompasses enhancement sites within wetlands, lakes and rivers within the Parsnip River drainage of the Williston Reservoir Watershed (Figure 1). Eight Sites were located along the Crooked River – Highway 97 corridor: Neilson Lake, Old Mill Pond, Tudyah North, Crooked River #1 and #2, Kerry Lake, 42 Mile Marsh, and Misinchinka. A further seven sites were located along or adjacent to the east side of the Parsnip Reach (Williston Reservoir) near Mackenzie, BC: Rocky Marsh; Mugaha A, B and G; Tutu B and Bay; and Dina Lake. The 2 remaining sites (60 km Marsh and Robert's Pond) were wetlands adjacent to the Finlay Forest Service Road on the west side of the Parsnip Reach (Juelfs and Corbould 2008).

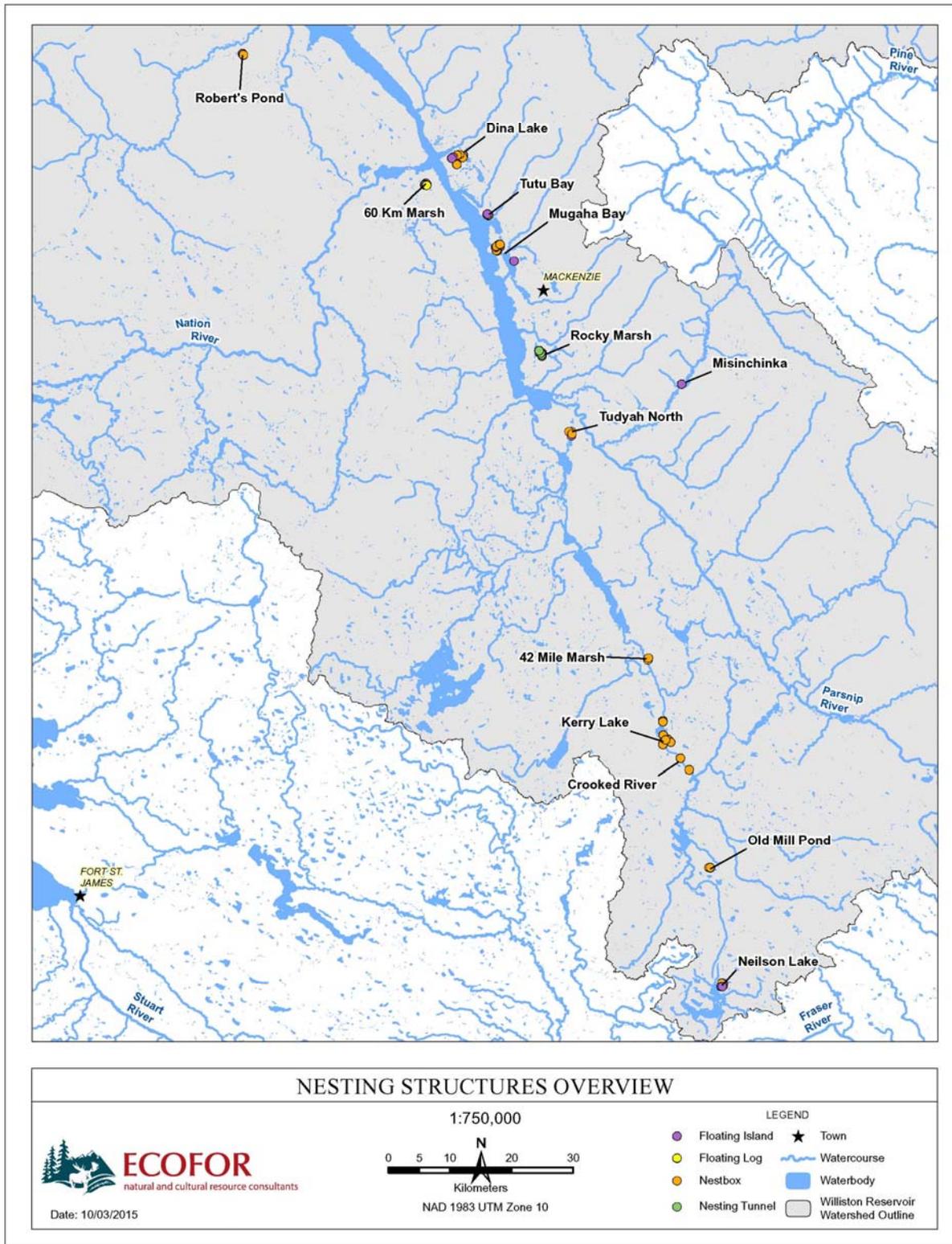


Figure 1. Artificial Nesting Structure Overview Map of Existing Structures

## **4.0 METHODS**

This project followed the approach of previous, well established monitoring and maintenance projects of the FWCP-PEACE. This approach, including recommendations, is summarized in the 1992-2006 monitoring and maintenance report (Juelfs and Corbould 2008). Our methodology is outlined below.

### **4.1 SITES**

All existing nesting structures were included in this project. In total, there are 75 structures comprised of: 54 nest boxes, 17 floating islands, 1 floating log and 3 nesting tunnels.

### **4.2 TIMING**

Nesting structure monitoring and maintenance activities were typically conducted every 3 or 4 years in late summer/fall, as allowed by FWCP-PEACE staff availability (Corbould pers comm). Sites were sampled during the period between September 18 and October 14, 2014 well after fledgling departure and waterfowl use of the structures are very low.

### **4.3 ACCESS**

All sites were accessed by vehicle, walking / wading and by boat. All sites were relocated using previously mapped sites and Global Positioning System (GPS) points provided by FWCP-PEACE.

## **5.0 RESULTS AND DISCUSSION**

Waterfowl nesting structures were visited in the fall of 2014 between the dates of September 18<sup>th</sup> and October 14<sup>th</sup>. All previously documented structures were identified via maps and relocated in the field and assigned new GPS coordinates for ease of identification / relocation of sites for future maintenance activities (Appendix A). Appendix B contains the table highlighting recommendations for the next maintenance period. Photo documentation of all sites were taken and representative photo samples are in Appendix C.

### **5.1 NESTBOXES**

A total of 53 nest box locations were visited between all sites in the Parsnip River drainage. All nest boxes were successfully re-located and maintenance activities of nestboxes occurred with the documentation of use and replacement of woodchips. All damaged or non-functioning nestboxes were replaced with a new one where feasible. Exceptions were made for nestboxes

within Dina Lake, Tutu and Mugaha Marsh due to an adjoining water license study. Damaged nestboxes should be replaced during the next maintenance period.

Out of 53 nest boxes, 65% of the nestboxes showed sign of use by wildlife and waterfowl with some nestbox locations showing high use over others. Recommendations for each site will follow in Section 6.0.

Neilson Lake: Four out of five nestboxes showed signs of use by the following waterfowl species: common merganser (*Mergus merganser*), bufflehead (*Bucephala albeola*) and Barrow's goldeneye (*Bucephala islandica*). Neilson Lake is an excellent waterfowl nesting locale and continued program support is warranted.

Old Mill Pond: Three out of three nestboxes showed signs of species use including Barrow's goldeneye, owl (unknown species) and unknown waterfowl.

Crooked River: Three out of the four nestboxes showed use by waterfowl. Barrow's goldeneye was found to occupy 2 and an unknown was documented. The fourth nestbox was situated on a snag that broke off into the water and likely washed downstream during high spring water flow.

Kerry Lake: Four of the 6 nestboxes showed use primarily by common mergansers with two nestboxes not being located at mapped and GPS points. Two new nest boxes were established to replace these.

42 Mile Marsh: Both nestboxes showed use by waterfowl. Both Barrow's goldeneye and Common Goldeneye were documented using these nestboxes.

Robert's Pond: Both nestboxes showed signs of use but likely by red squirrel. No evidence of waterfowl use was noted. Flight line to one nest box required extensive clearing to open it up again. Access was difficult to the site due to extensive mountain pine beetle kill and blowdown.

60 km Marsh: All four nestboxes were utilized by waterfowl such as Barrow's goldeneye and common merganser.

Tudya North: All three nestboxes were not functional having fallen over. Two from dead pine trees and a beaver chewed down the third. All three nestboxes were re-established.

Dina Lake: Seven out of eight nestboxes showed utilization by waterfowl, primarily by buffleheads and Barrow's goldeneye. Two nestboxes are currently not functional and were not repaired / replaced due to an ongoing water license study.

Tutu Bay: Three out of the four nestboxes showed use likely by weasel due to extremely heavy and strong musty smell and lichen build-up within the nestboxes. No waterfowl use was evident. The 4<sup>th</sup> nestbox was fallen over and not functional. This box was not replaced due to an ongoing water license study.

Mugaha Marsh: Of the six nestboxes, only 1 showed evidence of use by waterfowl, and 1 used by Northern Flicker (*Colaptes auratus*). Two nestboxes were rendered non-functional when trees fell over and two nestboxes are located with extensive willow / vegetation growth inhibiting use due to flight line path to nestbox. The nestboxes that were fallen over were taken out and not replaced. The two in trees with willow / vegetation growth inhibiting flight were not cleared or enhanced due to the nearby water license study. The 6<sup>th</sup> nestbox showed unknown use by wildlife.

Rocky Marsh: All 6 nestboxes showed no evidence of waterfowl use or nesting despite being functional and of good condition. Recommendations are as follows in Section 6.0.

## 5.2 FLOATING ISLANDS

Seventeen floating islands were assessed during the maintenance survey. Most of the islands are still functional, yet some showed signs of deterioration which will require future removal and possible replacement. With regular maintenance, wooden islands are expected to last 10 or more years (Clark 2000) and many of the structures are currently over 20 years old, exceeding the typical lifespan of floating islands. However, the floating islands at 60 km Marsh, Tudy North, Tutu, Mugaha G and Rocky Lake (I2) are no longer functioning due to shoreline stranding and structural deterioration such as boards coming loose and becoming rotten and will require future removal.

All functioning islands were noted to primarily provide roosting / loafing opportunities by aquatic furbearers such as beaver and muskrat, and not by waterfowl for nesting as originally intended. It was difficult to determine use by waterfowl species as no nesting activity was documented and no feathers were noted. It is suspected waterfowl regularly use the islands for roosting / loafing but evidence is difficult to document.

### 5.3 FLOATING LOG

One floating log was assessed at 60 km Marsh and it was half sunk underwater due to being water logged. The log showed evidence of roosting by waterfowl and use by muskrats to loaf on.

### 5.4 ROCKY MARSH INTERPRETIVE TRAIL AND OBSERVATION TOWER

Rocky Marsh interpretive area was part of a Wetland Conservation Project in which FWCP-Peace and Ducks Unlimited were the main partners among a group of community stakeholders. It is understood some clearing of the interpretive trail by other by volunteer fire crews, however blowdown was current along the sections we could see and the viewing tower had pine trees which were leaning against the railing and structure. FWCP-Peace staff and contractor maintained the viewing tower in 2011 however, it is unsure who the dedicated caretakers are of Rocky Marsh Interpretive site. There are safety concerns with the level of mountain pine beetle blowdown occurring within the Rocky Marsh area to individuals who wish to utilize the interpretive trails and observation tower.

## 6.0 RECOMMENDATIONS

### 6.1 MAINTENANCE

- Following recommendations in Juelfs and Corbould 2008, Ecofor maintains FWCP should follow the recommendation put forth by Ducks Unlimited Canada, in which data indicates that if nestboxes are not maintained and repaired regularly at least every 3 years, their use by waterfowl dropped significantly. Regular maintenance also extends the longevity of nest boxes. It is recommended regular maintenance activities occur at 3 year intervals, or structures should be removed.
- When conducting nestbox maintenance, ensure all previous nesting material (including nesting down) is removed and wood shavings are replaced (even if the nestbox was not used) because it may increase its use and productivity by waterfowl (Utsey and Hepp 1997).
- Juelfs and Corbould (2008) recommended to replace nestboxes and floating islands when structures have reached 7-10 years of age, or when signs of significant deterioration are evident. The program to date, has been to replace the nest boxes when they are structurally compromised and / or damaged beyond repair. It is

recommended to continue practical determination at each 3 year interval as some boxes are in excellent shape beyond 7-10 years.

- Most floating islands have exceeded their lifespan and will require replacing during the next maintenance period or as a separate project from the regular nestbox maintenance.

## 6.2 REMOVAL AND ADDITION OF NESTING STRUCTURES

### 6.2.1 Nestboxes

- Continue routine nestbox maintenance at the following sites: Neilson Lake, Old Mill Pond, Crooked River, Kerry Lake, 42 Mile Marsh, 60 km Marsh and Dina Lake.
- Assess the following to be considered for removal due to lack of waterfowl use: Robert's Pond, Tudyah north, Tutu Bay and Rocky Marsh. Dependent on waterfowl use evidence during 2017 session.
- Due to existing water license study, only basic maintenance activities occurred with the cleaning out boxes and replacing the wood chips at the following sites: Dina Lake, Tutu and Mugaha. All non-functioning nest boxes were either removed or left in place. Nestboxes are to be replaced as soon as possible once the water license study is complete.
- Rocky Marsh: Explore the feasibility of nestbox maintenance activities and the continuation of educational / public viewing opportunities. Low to no waterfowl use of the structures combined with extensive mountain pine beetle kill and blowdown along the access road, trails and viewing platform creates both an ongoing maintenance cost and safety hazard.
  - Should structures be removed and discontinued at Rocky Lake, explore alternative habitat enhancement activities with stakeholders in the surrounding area which will be an attraction for educational institutions and public interest.
- Tutu bay: Consider pulling all nest boxes at next maintenance interval if no waterfowl use is documented and locate other candidate sites.
- Crooked River: Replace nest box and consider alternative sites along Crooked River due to high use by waterfowl. This may require use of canoe and / or boat.
- Examine feasibility of increasing nest box sites at new candidate locations due to pulling of nestboxes from sites in which nestboxes are not utilized by waterfowl. This is time consuming to locate candidate sites which include access limitations and clearing.

### 6.2.2 Floating Islands

- Remove identified islands which are currently not functioning as soon as possible and replace with new structures during the next maintenance period.
- Recommend that floating islands to be built in advance of the next maintenance period. These will replace existing, and deteriorating islands to the benefit of aquatic furbearers and waterfowl.

### 6.2.3 Floating Log

- Replace floating log with new log at 60 km Marsh at the next 3 year maintenance period.
- Explore feasibility of anchoring roosting logs at additional sites not prone to shifting ice movement.

#### **Alternative Recommendations for Floating Islands**

- Remove as much structure as possible during the next maintenance period and do not replace.

### 6.2.4 Nesting Tunnels

- All 3 tunnels at Rocky Marsh have lost structural integrity with the collapse of the wire mesh. In addition, annual straw placement before each nesting period has not occurred and therefore no waterfowl use will occur.
- Removal all three tunnels from Rocky Lake as per recommendation in Juelfs and Corbould 2008.

#### **Alternative Recommendation**

- Determine if it is possible to remove the wire mesh from the metal posts and bolt on a 2"x 6" board to create a perching / resting platform for avian species within the marsh.

### 6.2.5 Future Maintenance Recommendations and Consideration

- Community engagement should be made to gauge the interest of local clubs and First Nations to take ownership of future data collection and maintenance activities at 3 year intervals. The next maintenance period should take place in 2017.
- Most sites are difficult to readily access for viewing opportunities. Rocky Marsh interpretive site is complicated by the recent mountain pine beetle kill which creates

added maintenance costs and safety concern for the trail system and viewing tower to the public. Lack of waterfowl use of the structures, time since the interpretive signs, observation tower and trails were built and recent accessibility issues from mountain pine beetle blow down may have resulted in little public use of the site. Local community dialogue should be conducted between stakeholders to determine interest of community involvement in the continued maintenance of Rocky Marsh. Stakeholders at the time of development of Rocky Marsh Interpretive Site was headed by FWCP-Peace and Ducks Unlimited with the following cooperating partners: Donohue Forest Products Inc., Mackenzie Scouts, Mackenzie Cadets, Mackenzie Nature Observatory, Mackenzie High School (Woodlot Forestry Program), Rocky Mountain Riders Snowmobile Club, Ministry of Environment Lands and Parks, Ministry of Forests and District of Mackenzie.

- Neilson Lake is an excellent candidate for construction of an educational viewing platform which can offer waterfowl and wildlife viewing opportunities with easy access. Neilson Lake is in close approximation to Bear Lake, Summit Lake and Prince George community centers. The location of a potential viewing tower is close enough to the main road that it can be made wheelchair accessible. The potential feasibility of this project should be explored, in particular if the decision is made to cease maintenance activities at Rocky Marsh.
- Data collection and maintenance activities are labor intensive but also require a qualified biologist to assess waterfowl and wildlife use along with the structural functionality of waterfowl structures. Previous maintenance activities were carried out by internal FWCP-PEACE staff and hired assistant. Cost of maintenance could be reduced with local volunteer involvement. Work involves use of a boat and walking / wading through heavy brush to reach nest box locations and therefore reasonable physical fitness is required.
- Safety concerns and training requirements for utilizing boats and safety equipment and use of ladders at heights to reach the nestboxes require qualified personnel to undertake some of the required maintenance activities safely.

## 7.0 ACKNOWLEDGEMENTS

Ecofor Consulting Ltd. would like to thank FWCP-Peace for funding to carry out this project and providing the initial field data, maps and GPS coordinates to complete the assessments.

Additional support for the project was given by McLeod Lake Indian Band. Ducks Unlimited Canada provided in kind partnership funding for the purchase of building material and plans for the construction of additional nest boxes. Field assessment of structures and activities were conducted by Greg Blackburn and Jennifer Jung. Special thanks to the Mackenzie Forest District Fire crew for the clearing of pine blow down material to give access to Rocky Marsh.

## 8.0 REFERENCES

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## 9.0 APPENDIX A: GPS LOCATION OF SITES

| Location      | Feature Type    | GPS Description (KML & GPX) | UTM | x      | y       |
|---------------|-----------------|-----------------------------|-----|--------|---------|
| 42 Mile Marsh | Nestbox         | 42mi25-2014                 | 10  | 510985 | 6071858 |
|               | Nestbox         | 42mi26b-2014                | 10  | 511000 | 6072158 |
| 60 Km Marsh   | Nestbox         | 60km15-2014                 | 10  | 475017 | 6149159 |
|               | Nestbox         | 60km16b-2014                | 10  | 475122 | 6148927 |
|               | Nestbox         | 60km17-2014                 | 10  | 474794 | 6148951 |
|               | Nestbox         | 60km18--2014                | 10  | 474982 | 6149209 |
|               | Floating Island | 60kmi-2014                  | 10  | 474860 | 6149004 |
|               | Floating Log    | LOG1-2014                   | 10  | 475076 | 6148876 |
| Crooked River | Nestbox         | C#1-30-2014                 | 10  | 513381 | 6061856 |
|               | Nestbox         | C#1-31-2014                 | 10  | 513349 | 6061685 |
|               | Nestbox         | C#2-1-2014                  | 10  | 516222 | 6055759 |
|               | Nestbox         | C#2-2-2014                  | 10  | 517665 | 6053943 |
| Dina Lake     | Nestbox         | D1-2014                     | 10  | 481067 | 6153706 |
|               | Nestbox         | D2-2014                     | 10  | 480969 | 6153705 |
|               | Nestbox         | D3-2014                     | 10  | 480957 | 6153359 |
|               | Nestbox         | D4-2014                     | 10  | 480407 | 6153884 |
|               | Nestbox         | D5-2014                     | 10  | 479571 | 6153256 |
|               | Nestbox         | D6-2014                     | 10  | 479535 | 6153544 |
|               | Nestbox         | D7-2014                     | 10  | 479974 | 6152235 |
|               | Nestbox         | D8-2014                     | 10  | 480015 | 6153775 |
|               | Floating Island | DisI2-2014                  | 10  | 479390 | 6153455 |
|               | Floating Island | DI-IsI-2014                 | 10  | 479158 | 6153254 |
| Kerry Lake    | Nestbox         | K1-2014                     | 10  | 513383 | 6057982 |
|               | Nestbox         | K2-2014                     | 10  | 514195 | 6058820 |
|               | Nestbox         | K3-2014                     | 10  | 514666 | 6058404 |
|               | Nestbox         | K4-2014                     | 10  | 513653 | 6058877 |
|               | Nestbox         | K5-2014                     | 10  | 513456 | 6059542 |
|               | Nestbox         | K6-2014                     | 10  | 513814 | 6058791 |
| Old Mill Pond | Floating Island | Mill-I-2014                 | 10  | 521025 | 6038156 |
|               | Nestbox         | Mill27-2014                 | 10  | 521031 | 6037985 |
|               | Nestbox         | Mill28-2014                 | 10  | 520835 | 6038053 |
|               | Nestbox         | Mill29-2014                 | 10  | 521070 | 6038052 |
| Misinchinka   | Floating Island | Mischi-2014                 | 10  | 516446 | 6116614 |
| Mugaha Bay    | Floating Island | Mug-i1-2014                 | 10  | 486962 | 6139320 |
|               | Floating Island | Mug-i2-2014                 | 10  | 486778 | 6139358 |
|               | Floating Island | Mug-i3-2014                 | 10  | 486955 | 6138998 |
|               | Nestbox         | Mug10b-2014                 | 10  | 486831 | 6139362 |

|              |                 |              |    |        |         |
|--------------|-----------------|--------------|----|--------|---------|
|              | Nestbox         | Mug5-2014    | 10 | 486489 | 6138353 |
|              | Nestbox         | Mug6-2014    | 10 | 486423 | 6138409 |
|              | Nestbox         | Mug7-2014    | 10 | 486257 | 6138933 |
|              | Nestbox         | Mug8-2014    | 10 | 486380 | 6139046 |
|              | Nestbox         | Mug9-2014    | 10 | 486942 | 6139341 |
|              | Floating Island | MugG-i-2014  | 10 | 489245 | 6136670 |
| Neilson Lake | Nestbox         | N1-2014      | 10 | 522774 | 6018692 |
|              | Nestbox         | N2b-2014     | 10 | 523113 | 6018740 |
|              | Nestbox         | N3-2014      | 10 | 523133 | 6019078 |
|              | Nestbox         | N4-2014      | 10 | 523168 | 6019218 |
|              | Nestbox         | N5-2014      | 10 | 522920 | 6019253 |
|              | Floating Island | Nisl1-2014   | 10 | 522857 | 6018779 |
|              | Floating Island | Nisl2-2014   | 10 | 523049 | 6018782 |
|              | Floating Island | Nisl3-2014   | 10 | 523030 | 6018717 |
| Rocky Marsh  | Nestbox         | R2-2014      | 10 | 493784 | 6121534 |
|              | Nestbox         | R3-2014      | 10 | 493806 | 6121676 |
|              | Nestbox         | R4-2014      | 10 | 493643 | 6121720 |
|              | Nestbox         | R5-2014      | 10 | 493260 | 6122055 |
|              | Nestbox         | R6-2014      | 10 | 493286 | 6122141 |
|              | Nestbox         | R7-2014      | 10 | 493331 | 6121769 |
|              | Floating Island | Rock-I1-2014 | 10 | 493784 | 6121710 |
|              | Floating Island | Rock-I2-2014 | 10 | 493733 | 6121214 |
|              | Floating Island | Rock-I3-2014 | 10 | 493374 | 6122035 |
|              | Nesting Tunnel  | Rock-T1-2014 | 10 | 493693 | 6121364 |
|              | Nesting Tunnel  | Rock-t2-2014 | 10 | 493569 | 6121685 |
|              | Nesting Tunnel  | RT-3-2014    | 10 | 493308 | 6122109 |
|              | Obs. Tower      | Rock         | 10 | 493784 | 6121710 |
| Roberts Pond | Nestbox         | Rob19-2014   | 10 | 445260 | 6170305 |
|              | Nestbox         | Rob20-2014   | 10 | 445372 | 6170085 |
| Tutu Bay     | Nestbox         | T1b-2014     | 10 | 485027 | 6144077 |
|              | Nestbox         | T2-2014      | 10 | 484986 | 6144133 |
|              | Nestbox         | T3-2014      | 10 | 484922 | 6144181 |
|              | Nestbox         | T4-2014      | 10 | 485108 | 6144189 |
|              | Floating Island | Tutu-i-2014  | 10 | 484910 | 6144305 |
| Tudyah North | Floating Island | Tudi-2014    | 10 | 498512 | 6108194 |
|              | Nestbox         | Tud1-2014    | 10 | 498555 | 6108846 |
|              | Nestbox         | Tud2-2014    | 10 | 498165 | 6108845 |
|              | Nestbox         | Tud3-2014    | 10 | 498642 | 6108480 |

## 10.0 APPENDIX B: MAINTENANCE REQUIREMENTS

| Location      | Feature Type    | GPS Description (KML & GPX) | Recommendations for Next Maintenance Period                         | Year to Complete |
|---------------|-----------------|-----------------------------|---|------------------|
| 42 Mile Marsh | Nestbox         | 42mi25-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | 42mi26b-2014                | Regular maintenance   | 2017             |
| 60 Km Marsh   | Nestbox         | 60km15-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | 60km16b-2014                | Regular maintenance   | 2017             |
|               | Nestbox         | 60km17-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | 60km18-2014                 | Regular maintenance   | 2017             |
|               | Floating Island | 60kmi-2014                  | Remove and replace with new island                                  | 2017             |
|               | Floating Log    | LOG1-2014                   | Replace with new floating log                                       | 2017             |
| Crooked River | Nestbox         | C#1-30-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | C#1-31-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | C#2-1-2014                  | Requires new candidate tree and nestbox                             | 2017             |
|               | Nestbox         | C#2-2-2014                  | Regular maintenance   | 2017             |
| *Dina Lake    | Nestbox         | D1-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | D2-2014                     | *Requires new nestbox   | 2017             |
|               | Nestbox         | D3-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | D4-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | D5-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | D6-2014                     | *Requires new nestbox   | 2017             |
|               | Nestbox         | D7-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | D8-2014                     | Regular maintenance   | 2017             |
|               | Floating Island | Disl1-2014                  | Island was removed in 2011. Replace with new island.                | 2017             |
|               | Floating Island | Disl2-2014                  | Plan for removal / replacement                                      | 2017             |
| Kerry Lake    | Nestbox         | DI-Is1-2014                 | Plan for removal / replacement                                      | 2017             |
|               | Nestbox         | K1-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | K2-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | K3-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | K4-2014                     | Regular maintenance   | 2017             |
|               | Nestbox         | K5-2014                     | Regular maintenance   | 2017             |
| Old Mill Pond | Nestbox         | K6-2014                     | Regular maintenance   | 2017             |
|               | Floating Island | Mill-I-2014                 | Plan for removal / replacement                                      | 2017             |
|               | Nestbox         | Mill27-2014                 | Regular maintenance   | 2017             |
|               | Nestbox         | Mill28-2014                 | Regular maintenance   | 2017             |
| Misinchinka   | Nestbox         | Mill29-2014                 | Regular maintenance   | 2017             |
|               | Floating Island | Mischi-2014                 | Plan for removal / replacement                                      | 2017             |
| *Mugaha Bay   | Floating Island | Mug-i1-2014                 | Plan for removal / replacement. If good - attempt tow to deep water | 2017             |
|               | Floating Island | Mug-i2-2014                 | Plan for removal / replacement. If good - attempt tow to deep water | 2017             |

|              |                 |              |  |      |
|--------------|-----------------|--------------|--|------|
|              | Floating Island | Mug-i3-2014  | Plan for removal / replacement                                 | 2017 |
|              | Nestbox         | Mug10b-2014  | Regular maintenance  | 2017 |
|              | Nestbox         | Mug5-2014    | *Remove nestbox and find new tree                              | 2017 |
|              | Nestbox         | Mug6-2014    | *New nestbox and new nest tree needed                          | 2017 |
|              | Nestbox         | Mug7-2014    | *Remove nestbox and relocate to new tree                       | 2017 |
|              | Nestbox         | Mug8-2014    | Regular maintenance  | 2017 |
|              | Nestbox         | Mug9-2014    | *Replace nestbox with new tree                                 | 2017 |
|              | Floating Island | MugG-i-2014  | Remove and do not replace                                      | 2017 |
| Neilson Lake | Nestbox         | N1-2014      | Replace box in 2017. Regular maintenance                       | 2017 |
|              | Nestbox         | N2b-2014     | Regular maintenance  | 2017 |
|              | Nestbox         | N3-2014      | Regular maintenance  | 2017 |
|              | Nestbox         | N4-2014      | Regular maintenance  | 2017 |
|              | Nestbox         | N5-2014      | Replace box in 2017. Regular maintenance                       | 2017 |
|              | Floating Island | Nisl1-2014   | Plan for removal / replacement                                 | 2017 |
|              | Floating Island | Nisl2-2014   | Plan for removal / replacement                                 | 2017 |
|              | Floating Island | Nisl3-2014   | Plan for removal / replacement                                 | 2017 |
| Rocky Marsh  | Nestbox         | R2-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Nestbox         | R3-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Nestbox         | R4-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Nestbox         | R5-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Nestbox         | R6-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Nestbox         | R7-2014      | Regular maintenance<br>Removal to be discussed w/ stakeholders | 2017 |
|              | Floating Island | Rock-I1-2014 | Removal / replacement to be discussed w/ stakeholders          | 2017 |
|              | Floating Island | Rock-I2-2014 | Removal / replacement to be discussed w/ stakeholders          | 2017 |
|              | Floating Island | Rock-I3-2014 | Removal / replacement to be discussed w/ stakeholders          | 2017 |
|              | Nesting Tunnel  | Rock-T1-2014 | Remove tunnel or revert to perching platform                   | 2017 |
|              | Nesting Tunnel  | Rock-t2-2014 | Remove tunnel or revert to perching platform                   | 2017 |
|              | Nesting Tunnel  | RT-3-2014    | Remove tunnel or revert to perching platform                   | 2017 |
|              | Obs. Tower      | Rock         | Maintenance to be discussed w/ stakeholders                    | 2017 |
| Roberts Pond | Nestbox         | Rob19-2014   | Assess for removal if no use noted next maintenance period     | 2017 |

|              |                 |             |  |      |
|--------------|-----------------|-------------|--|------|
|              | Nestbox         | Rob20-2014  | Assess for removal if no use noted next maintenance period | 2017 |
| *Tutu Bay    | Nestbox         | T1b-2014    | Regular maintenance.<br>Assess for full removal.           | 2017 |
|              | Nestbox         | T2-2014     | Regular maintenance.<br>Assess for full removal.           | 2017 |
|              | Nestbox         | T3-2014     | Regular maintenance.<br>Assess for full removal.           | 2017 |
|              | Nestbox         | T4-2014     | New nestbox required if site maintained.                   | 2017 |
|              | Floating Island | Tutu-i-2014 | Remove and do not replace                                  | 2017 |
| Tudyah North | Floating Island | Tudi-2014   | Remove and do not replace                                  | 2017 |
|              | Nestbox         | Tud1-2014   | Regular maintenance  | 2017 |
|              | Nestbox         | Tud2-2014   | Regular maintenance  | 2017 |
|              | Nestbox         | Tud3-2014   | Regular maintenance  | 2017 |

## 11.0 APPENDIX C: PHOTO DOCUMENTATION

# FWCP-Peace Representative Functional Nestboxes



**Date:** 2014-09-16

**Comments:**

Kerry Lake: Active Nest Box

GPS: K5-2014



**Date:** 2014-09-16

**Comments:**

Kerry Lake: Active Nest Box

GPS: K5-2014



**Date:** 2014-09-16

**Comments:**

Kerry Lake: Active nest box

GPS: K2-2014

# FWCP-Peace Representative Functional Nestboxes



**Date:** 2014-09-23

**Comments:**

60 km Marsh: Active nestbox.

GPS: 60km18-2014

Older nestbox, yet durable due to dry, south exposure.



**Date:** 2014-02-17

**Comments:**

Dina Lake: Active nestbox.

GPS: D8-2014



**Date:** 2014-02-17

**Comments:**

Dina Lake: Active nestbox

GPS: D8-2014

# FWCP-Peace

## Representative Non-functional Nest Boxes



**Date:** 2014-09-17

**Comments:**

Dina Lake: non-functioning nestbox damaged by bear. Suspect nesting waterfowl / eggs were present.

GPS: D2-2014

Normally, the nestbox would be replaced with a new one. Due to a nearby water license study, it was taken down and not replaced. This box location will require a new one as soon as possible.



**Date:** 2014-09-23

**Comments:**

Roberts Pond: non-functioning. Porcupine chewed open box.

GPS: Rob19-2014

Suspect owl / squirrel use.

Replaced with new box.



**Date:** 2014-09-22

**Comments:**

Tudyah North: tree fell over due to beavers rendering nestbox non-functional.

GPS: Tud1-2014

New nestbox was installed adjacent to fallen tree.

# FWCP-Peace Representative Floating Islands



**Date:** 2014-09-17

**Comments:**

Dina Lake.

GPS: Disl-2014

Vegetation growth and beaver use of floating island. Boards coming loose on sides and sinking. Styrofoam visible along edge and bottom right corner.



**Date:** 2014-09-23

**Comments:**

60 km Marsh.

GPS: 60kmi-2014

Non-functional floating island grounded ashore from floating ice. No soil and all styrofoam is not present. Immovable from shallows and slated to be taken apart and removed.



**Date:** 2014-09-24

**Comments:**

Mugaha.

GPS: Mug-i3-2014

Grounded in shallow water. Boards are rotten and starting to come apart. Slated for removal / replacement during next maintenance period.

# Rocky Marsh Wetland Enhancement and Interpretive Site



**Date:** 2014-10-14

**Comments:**

Rocky Marsh Wetland Conservation Project sign.



**Date:** 2014-10-14

**Comments:**

Rocky Marsh interpretive sign along trail. Heavy mountain pine beetle blowdown behind the tree and situated below nestbox in the below photo.



**Date:** 2014-10-14

**Comments:**

Rocky Marsh nestbox. Heavy mountain pine beetle blowdown with interpretive sign just to the right of tree out of sight.

GPS: R4:2014

# Rocky Marsh Wetland Enhancement and Interpretive Site



**Date:** 2014-10-14

**Comments:**

Rocky Marsh observation tower.

Dead mountain pine beetle killed trees against the tower. No evidence of use by public.



**Date:** 2014-10-14

**Comments:**

Representative mountain pine beetle killed trees on ground. This is the view from behind the observation tower along what is the access trail.



**Date:** 2014-10-14

**Comments:**

Overview of outlet dam structure at Rocky Marsh. Beaver dam in background holding back water.

# FWCP-Peace Nesting Tunnels – Rocky Marsh



**Date:** 2014-10-14

**Comments:**

Rocky Marsh. Collapsed nesting tunnel.

GPS: Rock-T2-2014

Requires yearly maintenance and placement of straw prior to the spring nesting period



**Date:** 2014-10-14

**Comments:**

Rocky Marsh. Collapsed nesting tunnel.

GPS: Rock-T2-2014

Requires yearly maintenance and placement of straw prior to the spring nesting period.



**Date:** 2014-10-14

**Comments:**

Rocky Marsh. Nesting tunnel.

GPS: Rock-T3-2014

Requires yearly maintenance and placement of straw prior to the spring nesting period.