



## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

East Lansing Field Office (ES)

2651 Coolidge Road, Suite 101

East Lansing, Michigan 48823-6316

IN REPLY REFER TO:

March 30, 2016

#### Memorandum

To: Mark Holey, Project Leader, Green Bay Fish and Wildlife Conservation Office

From: Scott Hicks, Field Supervisor, East Lansing Ecological Services Field Office

Re: Reinitiation of Formal Consultation for the Removal of Lyons Dam, Ionia County, Michigan, Pursuant to Section 7 of the Endangered Species Act

Dear Mr. Holey:

Thank you for your letter of February 23, 2016, requesting reinitiation of formal consultation for the Lyons Dam removal project and its effects on the endangered snuffbox mussel (*Epioblasma triquetra*). Your request indicates that 86 snuffbox were found and moved to the relocation site, where subsequently 1 relocated mussel suffered mortality due to a low water event likely precipitated by operation of a dam upstream. You have requested reinitiation of consultation pursuant to the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion), Log No. 15-R3-ELFO-05, which requires reinitiation if fewer than 212 snuffbox mussels were captured and removed prior to construction.

The action area was divided into 6 survey regions, with snuffbox present in regions 3, 5, and 6 (Woolnough and Barnett, 2013). In the Opinion, the density of snuffbox and estimated population for regions 3 and 6 were: 0.54/m<sup>2</sup> and 4,320 live individuals; and 0.28/m<sup>2</sup> and 7,168 live individuals, respectively. The Opinion does not specify density or an estimated population for region 5, though only 3 live snuffbox were found. Estimated populations and snuffbox density was based on survey effort by Woolnough and Barnett in 2013.

The 2015 relocation survey was completed between August 26<sup>th</sup> and October 10<sup>th</sup>. A total of 86 live snuffbox were found in region 3 and relocated to region 6; no snuffbox were found in region 5. As noted above, a low water event resulted in the mortality of 1 of the relocated individuals. The number of individual snuffbox detected during the 2015 relocation survey was lower due to changes made to the survey area. The relocation survey area consisted of a smaller subset of the habitat in regions 3 and 5, in comparison to the 2013 survey area. Variation in the habitat between the areas surveyed in 2013 and 2015, resulted in differences in snuffbox density.

The 2015 relocation survey area encompassed areas with lower snuffbox densities than the 2013 survey area, resulting in a lower number of individuals detected in 2015. We have revised our analysis and conclude that there has been incidental take of 86 adult snuffbox in the form of harassment and 26 adults in the form of mortality. Of the 26 adult snuffbox mortalities, 4 are due to post-relocation mortality and 22 are from construction-related impacts.

The details of our revised analysis are in Attachment A-C. Please note that the Reasonable and Prudent Measures and Terms and Conditions have not changed from those in the August 2015 Opinion.

Thank you also for providing the report entitled "Relocation of Snuffbox (*Epioblasma triquetra*) in Grand River Lyons, MI: Endangered Species Act Section 7 Permit Requirements". We accept this report in fulfillment of the requirement outlined in Reasonable and Prudent Measure (RPM) #2, Term and Condition 2.2 in the Opinion.

This concludes formal consultation pursuant to section 7 of the Act. If project plans change or new information about the project becomes available that indicates listed species, proposed species or critical habitat may be affected in a manner or to an extent not previously considered, you should reinitiate consultation with our office.

We greatly appreciate the assistance and cooperation of your staff throughout this consultation process. If you have any questions, please contact Jessica Pruden, of this office, at (517) 351-8245 or [Jessica\\_Pruden@fws.gov](mailto:Jessica_Pruden@fws.gov).

c: Scott Hanshue, MDNR, Fisheries Division, Plainwell  
Daelyn Woolnough, Central Michigan University  
Melissa Eldridge, Ionia Conservation District

# **Attachment A: Updated Analysis for Biological Opinion (August 2015) on the Lyons Dam Removal Project, Grand River, Lyons, Michigan.**

## **1. Background**

Lyons Dam on the Grand River in the Village of Lyons, Michigan, is 4m high by 84m wide. The proposed project will remove approximately 2.5m of the dam, close the adjacent fish ladder, and restore high-gradient habitat of the Grand River. Construction will occur during the low flow period of mid-July to early-October in 2016. The U.S. Fish and Wildlife Service's (Service) National Fish Passage Program, Great Lakes Basin Fish Habitat Partnership and Great Lakes Fish and Wildlife Restoration Act are providing partial funding for the project. The removal of the dam will reconnect 25km of habitat upstream, 87 km of habitat downstream, and provide passage for fish and other aquatic species. The proposed project will benefit snuffbox and log perch, its host fish, by improving connectivity and restoring more natural conditions to this reach of the Grand River. However, mussel relocation survey effort required prior to dam removal will adversely affect snuffbox mussels in the action area. The Service's East Lansing Field Office completed a Biological Opinion (Opinion) in August 2015 that anticipated take of up to 264 adult snuffbox as a result of the proposed action.

Surveys for snuffbox were conducted within the action area in 2013 (Woolnough and Barnett 2013). Although survey efforts did not include fish species, logperch were documented in the action area during a 2014 MDNR fisheries survey (S. Hanshue, MDNR, pers. comm. 2015). The action area was divided into 6 survey regions, with snuffbox present in regions 3, 5, and 6. In region 3 the density of snuffbox was  $0.54/m^2$  and a population estimate of 4,320 live snuffbox. Region 3 has the most variable habitat and substrate. Three live snuffbox were recorded from region 5 during a timed-search survey. Seven live snuffbox were collected in region 6, comprising 17 percent of the mussel assemblage at a density of  $0.28/m^2$ . Region 6 was chosen as the relocation site and is approximately  $25,600m^2$ . Applying the snuffbox density estimate of  $0.28/m^2$  provides a population estimate of 7,168 individuals in region 6.

Based on the 2013 survey, in our Opinion we anticipated the incidental take of 264 snuffbox from the proposed action. We expected incidental take of 212 adults in the form of harassment and 63 adults in the form of mortality. Of the 63 mortalities, 52 mortalities are attributed to construction-related activities and 11 to post-relocation mortality. Between August 26<sup>th</sup> and October 10<sup>th</sup>, 2015, the relocation survey was completed. A total of 86 live snuffbox were found in region 3 and relocated to region 6, no snuffbox were found in region 5. A low water event on September likely due to dam operations upstream that occurred on September 24<sup>th</sup> and 25<sup>th</sup>, resulted in the mortality of 1 of the relocated individuals. The number of snuffbox incidentally taken during the relocation survey was considerably less than what was expected in the Opinion and reinitiation of formal consultation was necessary. Consultation was reinitiated by the Service's Green Bay Fish and Wildlife Conservation Office on February 23, 2016.

## **2. Effects of the action**

The analysis of the effect of the action was considered in several sections. Below we list the specific sections and discuss any pertinent changes based on the new information:

- Estimated population of snuffbox likely to be present in region 3 and 5 during 2015
  - Based on changes in the final construction drawings and an oversight, the 2015 relocation survey consisted of a smaller subset of the habitat in region 3 and 5, in comparison to the 2013 survey area.
  - There was variation between the habitat in the 2013 versus the 2015 survey areas.
  - Snuffbox densities in region 3 in the 2015 relocation survey area were lower than densities in the 2013 survey area.
  - During the 2015 relocation survey no snuffbox were found in region 5 in comparison to the 2013 survey area where 3 snuffbox were found.
  - Differences in snuffbox density likely affected number of individuals present in the 2015 relocation survey areas. More detail is provided under “Estimated Incidental Take” below.
  
- Direct and Indirect Effects
  - The new information does not change the mechanisms by which snuffbox would be directly or indirectly impacted.
  
- Estimate of Incidental take
  - The survey area for 2013 was different than the relocation survey area in 2015. This resulted in differences in snuffbox densities. Snuffbox occurred at lower densities<sup>1</sup> in the 2015 relocation survey area. Therefore, fewer individuals were likely present and thus detected.
  - We used the revised 2015 relocation survey areas with the associated densities and applied the methodology outlined in the Biological Assessment for the Removal of Lyons Dam (May 28, 2015) to recalculate the take estimate (Table 1).

Table 1. Number of snuffbox mussels impacted as a result of the relocation survey associated with the Lyons Dam removal project as described in the Opinion and as estimated based on the results of the 2015 relocation survey.

Incidental Take <sup>2</sup>	Biological Opinion Estimate	Revised Take Estimate
Total number of individuals incidentally taken	264	108
# harassed out of total	212	86
Total # mortalities	63	26
# of mortalities out of total mortalities due to construction related impacts	52	22
# of mortalities out of total mortalities due to 5% post relocation mortality	11	4

<sup>1</sup> See attachment B providing the 2015 relocation survey area map and relocation survey data summary (Relocation of Snuffbox (*Epioblasma triquetra*) in Grand River Lyons, MI: Endangered Species Act Section 7 Permit Requirements, CMU, 2015).

<sup>2</sup> See Attachment C - *Appendix E* of the Biological Assessment for the Removal of Lyons Dam (May 28, 2015) includes the calculations used to develop the incidental take in the Opinion; and *Calculations for the Revised Incidental Take Estimates for Reinitiation of the Biological Opinion on the Lyons Dam Removal Project*.

### **3. Jeopardy Analysis**

The jeopardy analysis has not changed significantly from that described in the Opinion. The number of snuffbox affected has decreased from 264 to 108. Disruption of normal breeding activity and a reduced number of glochidia during the relocation year are likely, though this disruption should be temporary. Alteration of breeding habitat below the dam due to silt and sediment moving through the system should also be short term. Therefore the proposed project should not detectably reduce the overall reproductive success of the snuffbox population.

A loss of 26 individuals will reduce the number of mussels in the river, though this represents only a small fraction of the total population estimated in the action area. In terms of the relocation, while 86 were removed from region 3, the majority of mussels in this region will remain and should not be impacted. The proposed action should also improve habitat conditions for snuffbox and logperch, potentially expanding the distribution of snuffbox in the Grand River. For these reasons we conclude that the proposed action, taken together with cumulative effects, would not directly or indirectly reduce the likelihood of both survival and recovery of the snuffbox by reducing the species' reproduction, numbers, or distribution.

### **4. Revised Incidental Take Statement**

The Service anticipates that no more than 108 snuffbox mussels will be incidentally taken as a result of the proposed action. The incidental take of 86 adult snuffbox has occurred in the form of harassment due to relocation activities and 26 adults in the form of mortality. Of the 26 adult snuffbox mortalities, 4 are due to 5% post relocation mortality and 22 are from construction related impacts.

### **5. References**

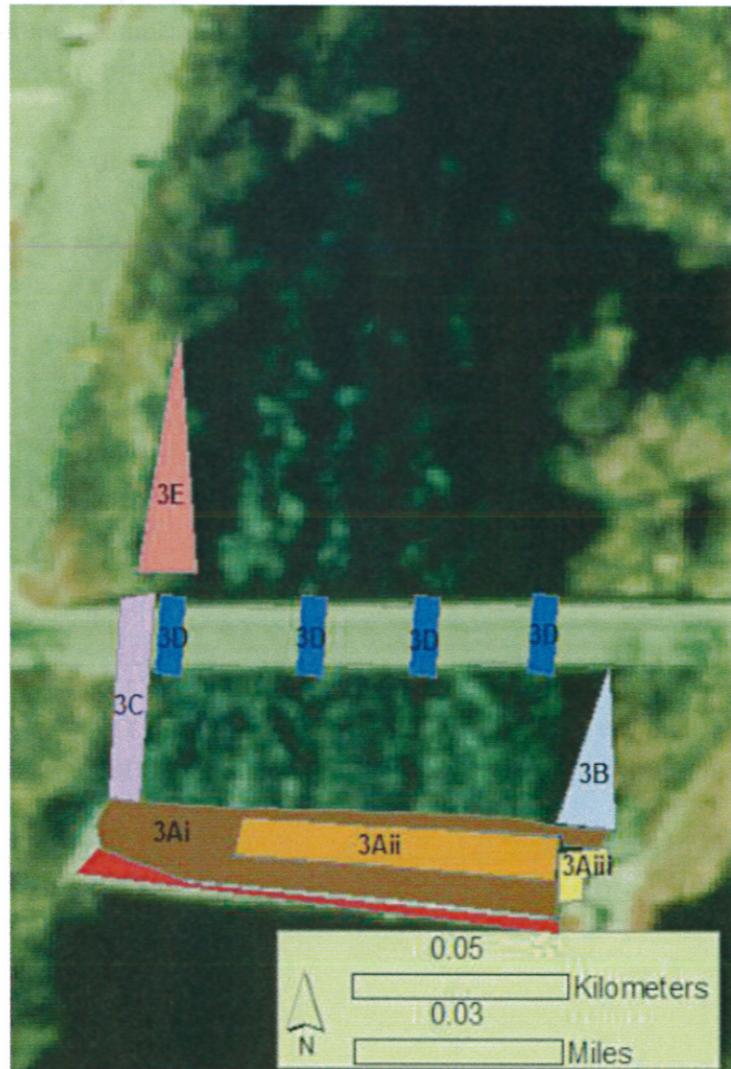
U.S. Fish and Wildlife Service (USFWS). 2015. Biological Opinion for the Removal of Lyons Dam, Ionia County, Michigan; Log No. 15-R3-ELFO-05.

Woolnough, D.A. and S.E. Barnett. 2013. Detection and quantification of snuffbox (*Epioblasma triquetra*) in Grand River Lyons, MI: section 7 permit requirements.

Woolnough, D.A. 2015. Relocation of Snuffbox (*Epioblasma triquetra*) in Grand River Lyons, MI: Endangered Species Act Section 7 Permit Requirements.



**Attachment B: 2015 Relocation Survey Area Map and 2015 Relocation Survey Data Summary.**



**Figure 3.** Sampling areas in Region 3- Fall 2015. Lyons Michigan, USA. See *Introduction* for breakdown of region. Red area indicates area logistically unfeasible to sample (e.g., extreme turbulence). 3D areas were 1m buffer searched around each of the bridge abutments as well as the area between abutments (see *Supplemental Data*).

**Summary of Sites- Lyons MI- Grand River Fall 2015**

		# of live individuals	# of snuffbox	Mussel Density	Snuffbox Density	Area searched (m <sup>2</sup> )
<b>Region 3</b>						
<b>A) Front of dam</b>						
	i) Searchable	49	6	0.073	0.009	668
	ii) Island	7	1	0.013	0.002	530
	iii) Fish Ladder	51	7	1.457	0.200	35
<b>B) East Bank Access Road (minus the front of dam region-Region 3A)</b>						
		196	11	0.131	0.013	170
<b>C) West Bank Access Road (minus the front of dam region- Region 3A)</b>						
		21	2	1.152	0.065	160
<b>D) Bridge Abutments (minus the road access area on the West Bank overlap)</b>						
		520	58	2.905	0.324	179
<b>E) Vane 2 area including access road</b>						
		341	1	1.795	0.005	190
<b>Region 5</b>						
		88	0	3.52	N/A	25
<b>TOTAL REGION 3A (Front of Dam)</b>		<b>107</b>	<b>14</b>	<b>0.514</b>	<b>0.070</b>	<b>1233</b>
<b>TOTAL REGION 3B+3C (Both Access Roads)</b>		<b>217</b>	<b>13</b>	<b>0.642</b>	<b>0.039</b>	<b>330</b>
<b>TOTAL REGION 3</b>		<b>1185</b>	<b>86</b>	<b>1.075</b>	<b>0.088</b>	<b>1932</b>
<b>TOTAL REGION 5</b>		<b>88</b>	<b>0</b>	<b>3.52</b>	<b>N/A</b>	<b>25</b>
<b>OVERALL TOTAL</b>		<b>1273</b>	<b>86</b>	<b>1.381</b>	<b>0.088</b>	<b>1957</b>

**Attachment C: Appendix E of the Biological Assessment for the Removal of Lyons Dam (May 28, 2015) and Calculations for the Revised Incidental Take Estimates for Reinitiation of the Biological Opinion on the Lyons Dam Removal Project.**

## APPENDIX E

### Snuffbox Calculations for Regions 3 and 5 in the Grand River

Snuffbox estimates were calculated using the indicated densities in the identified work areas (Figure 5). In the work area located below the dam estimates for relocation and take were calculated as follows:

Area A: From the right (east) descending bank out a distance of 65m and extending downstream 10m (7m work area plus 3 m buffer).

$65\text{m} \times 10\text{m} = 650\text{m}^2$  search area  
Snuffbox density =  $0.2/\text{m}^2$   
Snuffbox estimate for Area A = 130

Area B: From the left (west) descending bank out a distance of 19m and extending downstream 10m (7m work area plus 3 m buffer).

$19\text{m} \times 10\text{m} = 190\text{m}^2$  search area  
Snuffbox density =  $0.56/\text{m}^2$   
Snuffbox estimate for Area B = 107

Total Snuffbox in work area and buffer below the dam = 237 individuals

If the rock vane (below the dam and along the west bank) associated with the constructed riffle extends past the 7m work area and 3m buffer in Area B:

Estimated  $12.5\text{m} \times 1\text{m}$  footprint =  $12.5\text{m}^2$  search area  
Snuffbox density =  $0.56/\text{m}^2$   
Snuffbox estimate = 7

Total estimate (Area A +B)  $237 + 7 = 244$  Snuffbox

Estimates for relocation are based on a detection rate of 80% and therefore 20% take.

Area A -  $237 \times 0.8 = 190$  individuals to be relocated  
Area B -  $7 \times 0.8 = 6$  individuals to be relocated

Estimated take in Area A = 47 snuffbox

Estimated take in Area B = 1 snuffbox

Total estimated take for Area A & B = 48 snuffbox

Area C: Constructed rock vane downstream of bridge and scour mitigation measures on bridge piers:

Estimated  $30\text{m}^2$  footprint and buffer  
Snuffbox density =  $0.56/\text{m}^2$   
Snuffbox estimate = 17

Assuming 80% detection rate and 20% take.

$17 \times 0.8 = 14$  individuals to be relocated  
Estimated take in Area C = 3 Snuffbox

Area D: Hazel Devore Park - Island rip rap, vane and woody debris habitat. Snuffbox densities were very low in this area - 4.5 hour person hour timed search resulted in 3 Snuffbox.

Estimated  $25\text{m}^2$  footprint

Snuffbox estimate = 3

Assuming 80% detection rate and 20% take.

$3 \times 0.8 = 2$  individuals to be relocated  
Estimated take in Area D = 1 Snuffbox

Total Snuffbox to be relocated Areas A +B +C +D = 212 Snuffbox

Total estimated take during construction: Areas A +B +C+D = 52 Snuffbox

Post-relocation mortality (5%)

212 relocated individuals  $\times$  0.05 = 11 Snuffbox

Total Estimated Take = 64 Snuffbox

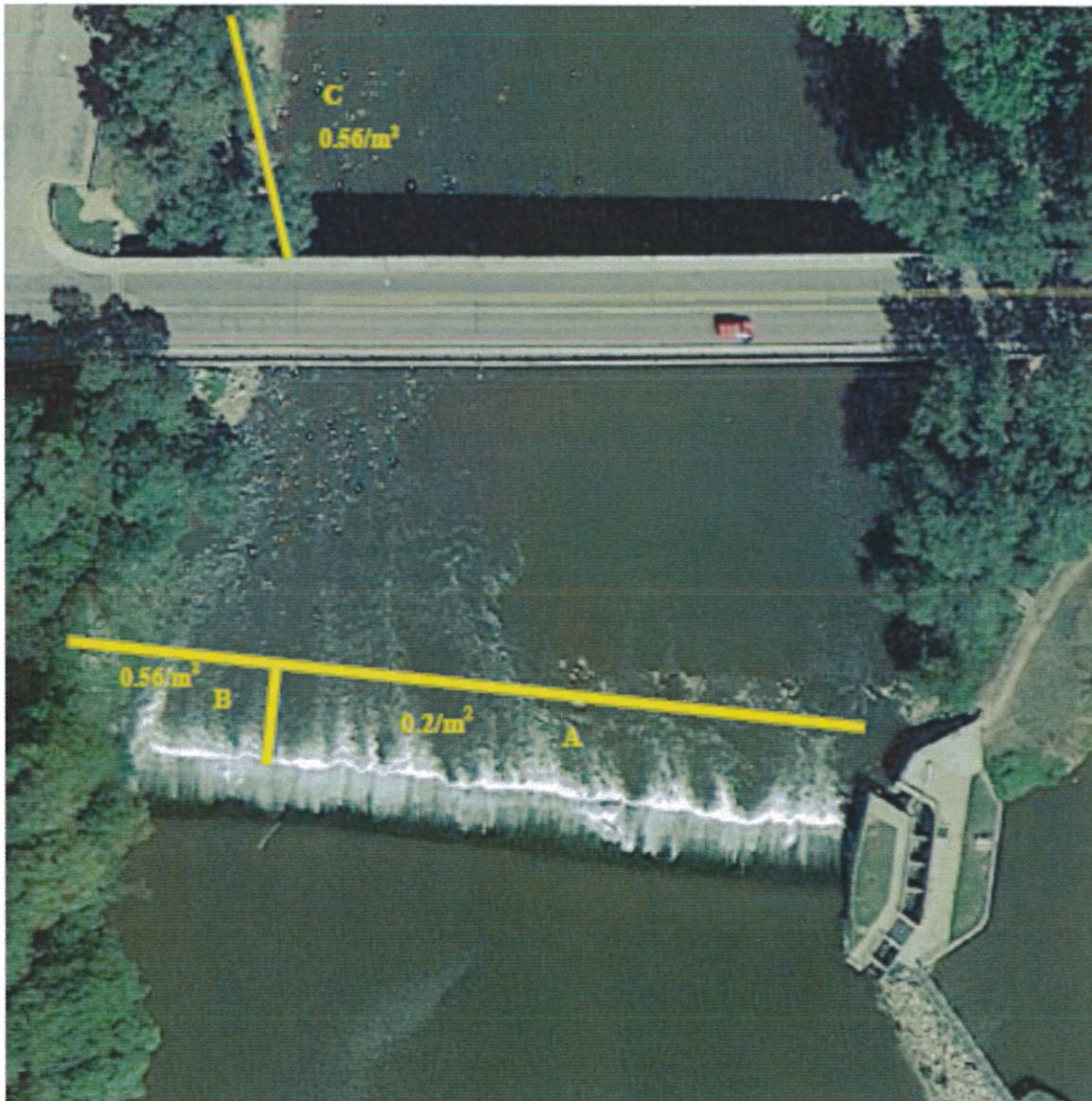


Figure 5. Densities of Snuffbox in work locations at Lyons Dam, Michigan. Image: Google Earth

## Calculations for the Revised Incidental Take Estimates for Reinitiation of the Biological Opinion on the Lyons Dam Removal Project

Methodology applicable to all calculation below: Estimates for relocation are based on a detection rate of 80% and 20% that cannot be detected and thus left behind expressed as mortality from construction related impacts. Density was calculated based on the number of snuffbox detected. Therefore, the number found represent the 80% detected. The total number of snuffbox likely present in the area was determined in order to calculate the 20% that could not be detected, estimated as mortality.

### Region 3\_Ai\_Searchable

$$\text{Area} = 668 \text{ m}^2$$

$$\text{Snuffbox density} = .009 \text{ m}^2$$

$$668 * .009 = \text{based on 80\% detection rate } 6.012 \text{ snuffbox found}$$

$$6.012 / .8 = 7.515 \text{ total snuffbox present}$$

$$7.515 * .2 = 1.503 \text{ snuffbox mortalities}$$

### Region 3\_Aii\_Island

$$\text{Area} = 530 \text{ m}^2$$

$$\text{Snuffbox density} = .002 \text{ m}^2$$

$$530 * .002 = \text{based on 80\% detection rate } 1.06 \text{ snuffbox found}$$

$$1.06 / .8 = 1.4045 \text{ total snuffbox present}$$

$$1.4045 * .2 = .2809 \text{ snuffbox mortalities}$$

### Region 3\_Aiii\_fish ladder

$$\text{Area} = 35 \text{ m}^2$$

$$\text{Density} = .200 \text{ m}^2$$

$$35 * .200 = \text{based on 80\% detection rate } 7 \text{ snuffbox found}$$

$$7 / .8 = 8.75 \text{ total snuffbox present}$$

$$8.75 * .2 = 1.75 \text{ snuffbox mortalities}$$

### **Region 3\_C and D access Roads**

Area for 3C = 160 m<sup>2</sup>

Density = .0125 m<sup>2</sup>

160\* .0125 = based on 80% detection rate 2 snuffbox found

2/.8 = 2.5 total snuffbox present

2.5\*.2 = .5 snuffbox mortalities

Area for 3B = 170 m<sup>2</sup>

Density = .064 m<sup>2</sup>

170\* .064 = based on 80% detection rate 10.88 snuffbox found

10.88/.8 = 13.6 total snuffbox present

13.6\*.2 = 2.72 snuffbox mortalities

### **Region 3\_D Bridge abutments**

Area = 179 m<sup>2</sup>

Density = .324 m<sup>2</sup>

179\* .324 = based on 80% detection rate 57.99 snuffbox found

57.99/.8 = 72.48 total snuffbox present

72.48\*.2 = 14.497 snuffbox mortalities

### **Region 3\_E Vane**

Area = 190 m<sup>2</sup>

Density = .005 m<sup>2</sup>

190\* .005 = based on 80% detection rate .95 snuffbox found

.95/.8 = 1.187 total snuffbox present

1.187\*.2 = .2375 snuffbox mortalities

### **Total Estimated Take For the Proposed Action**

Total number of snuffbox present from the calculations above for: Region 3\_Ai\_Searchable + Region 3\_Aii\_Island + Region 3\_Aiii\_fish ladder + Region 3\_C and D access Roads + Region 3\_D Bridge abutments + Region 3\_E Vane = **108 Total snuffbox incidentally taken (based on rounding final number).**

### **Total Number of Snuffbox Detected**

Region 3\_Ai\_Searchable + Region 3\_Aii\_Island + Region 3\_Aiii\_fish ladder + Region 3\_C and D access Roads + Region 3\_D Bridge abutments + Region 3\_E Vane = **86 snuffbox relocated (based on rounding final number).**

Due to a low water event, 1 of the detected and relocated mussels suffered mortality. Therefore the current number of mussels currently expected to be at the relocation site is **85.**

### **Total Snuffbox Mortality Resulting from Inability to Detect 20%**

$1.503 + .2809 + 1.75 + .5 + 2.72 + 14.497 + .2375 = 22$  snuffbox mortalities due to construction related impacts (based on rounding final number).

### **Total Number of Snuffbox Mortality Resulting from Post Relocation Mortality**

Post relocation mortality is expected to be 5%

$86 * .05 = 4$  snuffbox post relocation mortalities (based on rounding final number)

### **Total Estimated Take = 108 adult snuffbox**

**Total estimated incidental take due to relocation = 86 adult snuffbox**

**Total estimated take mortality = 26 adult snuffbox mortalities (22 snuffbox mortalities due to construction related impacts and 4 snuffbox post relocation mortalities)**