Summary of Activities

Date: November, 2017

To: Ian Kitch
MB Sustainable Development
Cc: Lloyd Rowe, Jonathan Stephens
Duck Mtn Cottage Owners Association
Blue Lakes Resort – Arch & Dawn Dowsett

From: Holly Urban, Brock Koutecky & Megan Paterson - Swan Valley Sport Fishing Enhancement Technical Staff
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Subject: East Blue Lake Trout Maintenance – White Sucker Removal 2017

Location: East Blue Lake, Duck Mountain Provincial Forest, 14U 367303 5717799

Background Information:
In recent years, studies on East Blue Lake identified white sucker populations as having negative effects on rainbow trout survival. Historic data suggests white suckers were non-existent prior to the rising water levels in 2010 and the recent influx has caused a direct increase in interspecific competition. These benthivores can play an important role in the ecology of both fish and benthic communities in lake and streams (Saint-Jacques, 2000). Unfortunately, white suckers can also be "extremely flexible in their use of resources" (Saint-Jacques, 2000) and have been reported to affect the yield of many species, including rainbow trout (Barton 1980). White suckers' tolerance of a wide range of environmental and chemical conditions, and their ability to exhibit thermoregulatory behaviour, are thought to largely explain their distribution and competitiveness (Stewart 1926; Spoor and Schloemer 1938; Verdon and Magnin 1977; Kavaliers 1982; Marrin 1983; Trippel and Harvey 1987; Logan et al. 1991). Fortunately, several studies identified white sucker removal programs can benefit a trout fishery.

In the spring of 2016, the "East Blue sucker removal program" was initiated based on 2015 recommendations to (1) further quantify white-sucker invasion, (2) remove as many white-suckers as possible and (3) develop an effective yet long term management program for East Blue Lake. The program was conducted by SVSFE, Intermountain Sport Fishing Enhancement Inc and Manitoba Sustainable Development - Fisheries Branch.

Between May 30th and June 7th 2016, team members successfully removed 2.9 tonnes of white suckers by means of trap nets, electrofishing and gill nets. Catches far exceeded expectations. A total of 3,576 suckers were caught, which formed 96.4% of the species composition of fish caught during the removal. The 2016 permit for this program allowed SVSFE to (1)transfer live white suckers to Sinclair Lake or (2) repurpose the fish to anglers/public for personal use. Of the 3,576 white suckers caught, 84% were transferred to Sinclair Lake and 16% were repurposed. (Refer to 2016 summary for detailed findings)

Figure 1: White suckers being held in a holding pen

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Background Information cont'd:
Following the 2016 removal, it was concluded the white sucker populations were much greater than previously estimated. Although CPUEs decreased as the project concluded, a significant population was still apparent and therefore it was suggested to continue the removal program in 2017. During the 2016 removal, many practices/suggestions were identified to improve the program's efficiency. Highlights include;

1) Timing is crucial - replicate program over the same dates and net locations
2) Utilize only effective capture methods; trap netting and electrofishing
3) Repurpose all suckers and find a recipient/market which could take a large number of fish versus relocating fish
4) Locate and target schools of suckers to increase electrofishing efficiency
5) Improve holding facilities to prevent fish escaping
6) Ensure spring trout stocking is scheduled post removal program
7) Continue program until sucker populations reach near or below 25% of the species composition

2017 Results: In the spring of 2017, the "East Blue Lake Sucker Removal" program was replicated. Beginning on May 30th and concluding on June 7th, program partners and local volunteers utilized trap nets for white sucker removal. Yet again, numbers far exceeded expectations. The 2017 program removed 2,630 white suckers from the population equating to 2.99 tonnes of fish.

Figure 2: White suckers being transferred from traps to pens

Fortunately this year SVSFE was able to source a mink farmer from Minnedosa, MB to take the majority of the catch (Table 1).

Table 1: Total fish removed during the 2017 White Sucker Removal Program

2017 Recipient	# Fish Removed	Biomass (g)	Biomass (Kg)
Mink Farmer	2,349	2,669,247	2,669
Anglers/ Public	281	319,310	319
Total WHSC Removed	2,630	2,988,557	2,989

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Results cont'd:

Trap nets were the only method of capture for 2017 as the team faced several mechanical issues with the electrofishing boat, which unfortunately could not be remedied prior to the program completion. A random sub-sample of white suckers was collected to determine biomass estimates. Results indicate the average sucker weighs 1,136 grams (2.5 lbs). Rainbow trout and walleye captured during the removal were measured and released. In addition, a sub-sample was aged to gather a better understanding of growth and stocking success. One northern pike was captured on the last day of the removal measuring in at 734 mm fork length. This fish was a surprise to many and was relocated to Chain Lakes.

Figure 3: Rainbow trout sampled and released

Figure 4: Walleye sampled and released (12 a)

Figure 5: White suckers removed from East Blue

Figure 6: Northern pike removed from East Blue

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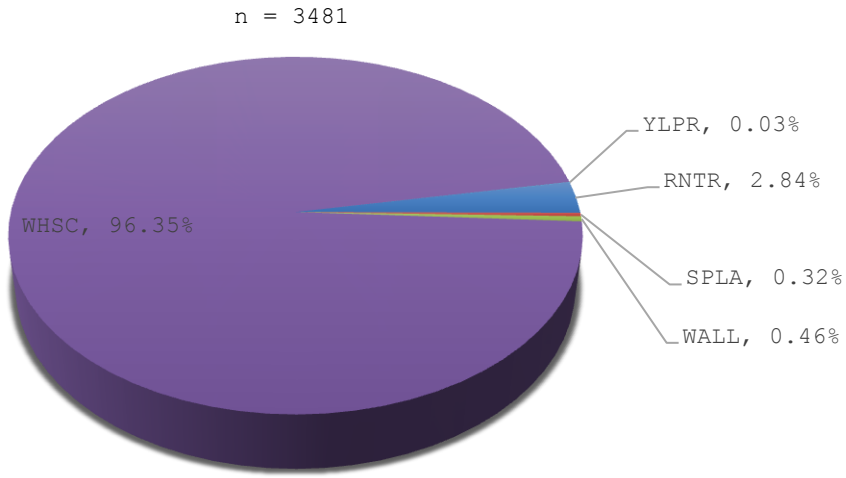
Results cont'd:

2016 EAST BLUE LAKE Trap Netting - Species Composition



2017 EAST BLUE LAKE Trap Netting - Species Composition

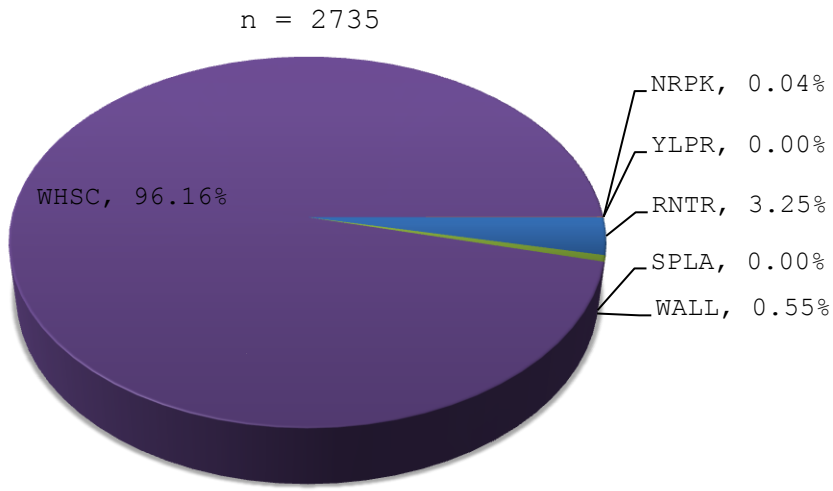


Figure 7: Species Composition comparison between 2016 & 2017 removal programs

White suckers remained the most abundant species with the composition only dropping by 0.2% after removing the first three tonnes in 2016. Important to note, this composition will be bias and illustrate high sucker percentages than that of the true composition. The program materializes during the sucker spawn and net locations only sample targetable areas where suckers frequent. Fortunately, due to the replication of the program, managers can still use the data to monitor changes to the white sucker numbers over time. Rainbow trout and walleye composition remained consistent between the two years. There was no presence of splake or yellow perch and one new occurrence of northern pike.

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Results cont'd:

CPUE: Evaluating number of fish caught by hours of trap netting is represented as catch per unit effort (CPUE) or # of fish caught per hour. CPUE is much more reliable for reflecting changes in population density within a lake (Schneider, 1998b) than differences in density between lakes. By comparing annual CPUE, managers can rate the success or failure of the program over time. Interestingly, there is some optimism that efforts are starting to scratch the surface. CPUE of suckers has dropped from 9.4 in 2016 to 6.5 in 2017 (Table 2).

Table 2: Catch per unit effort comparison of white suckers between 2016 & 2017

East Blue Lake White Sucker Removal			
	Effort (hours)	**Total Fish Caught**	**CPUE (fish/hour)**
2016	355.6	3,354	9.4
2017	404.6	2,630	6.5

In terms of CPUE comparison for other species, there is minimal change between the two years, although rainbow trout CPUE had a trivial decrease(Table 3).

Table 3: Catch per unit effort comparison of all species between 20116 & 2017

Year	Effort (hours)	WHSC CPUE	RNTR CPUE	SPLA CPUE	WALL CPUE	YLPR CPUE	NRPK CPUE
2016	355.6	9.43	0.28	0.03	0.04	0.00	-
2017	404.6	6.50	0.22	-	0.04	-	0.00

In terms of walleye, a total of 13 were caught with an average length of 428 mm. Ages varied from 2 to 15 years and all fish appeared to be quite healthy living in this trout fishery. Although these fish are top predators, anglers and habitat conditions appear to keep the population at a maintainable level. A slight increase in young walleye display recent spawning success in 2014 & 2015.

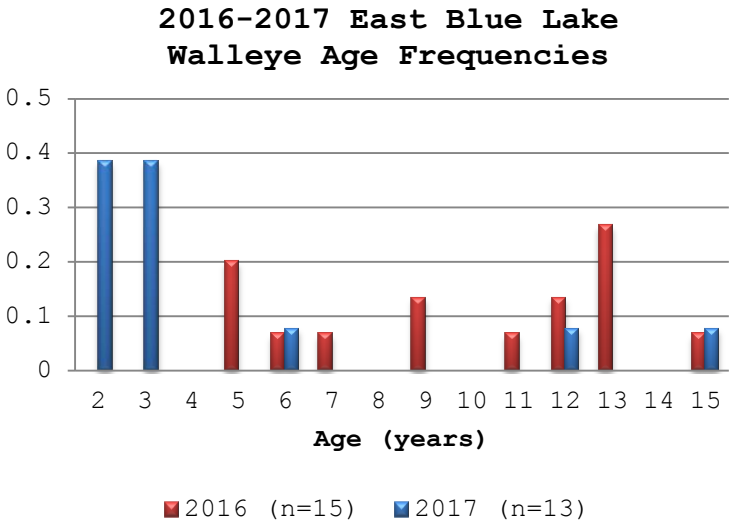

Figure 8: 2016 & 2017 walleye age frequencies

Figure 9: 15 year old walleye caught in East Blue

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Results cont'd:

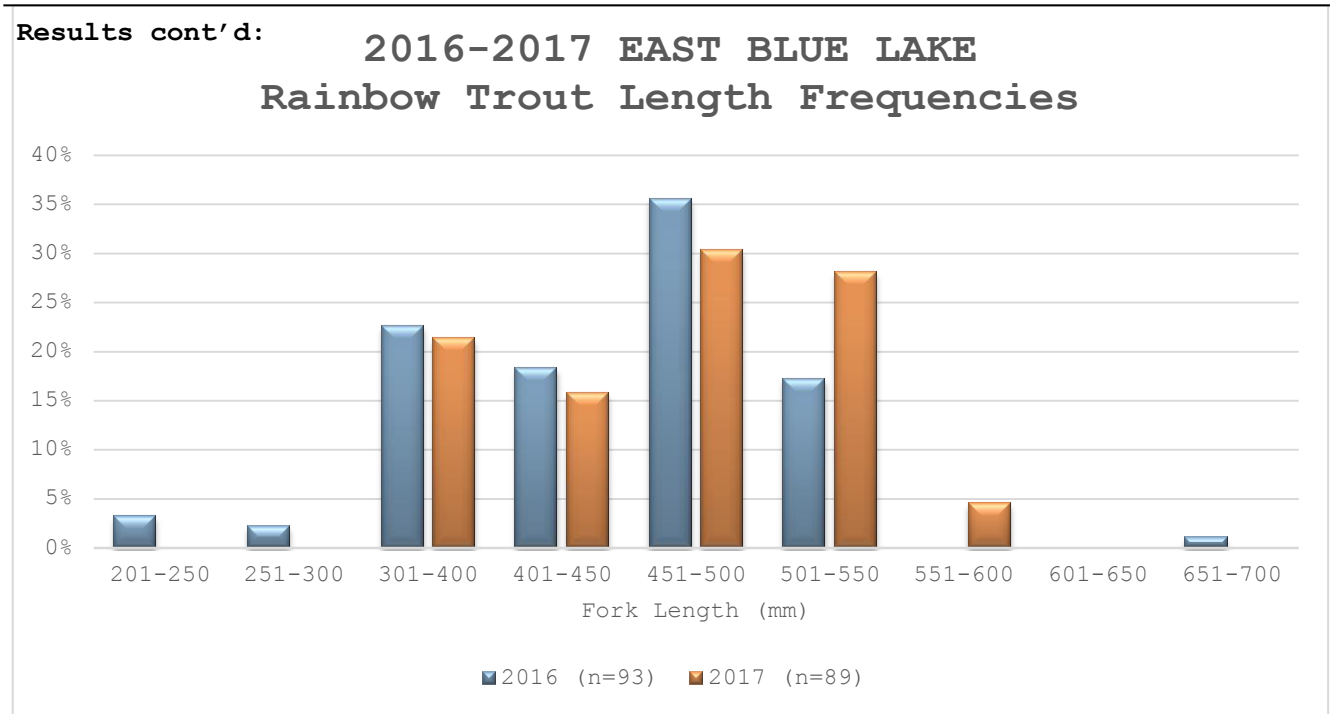
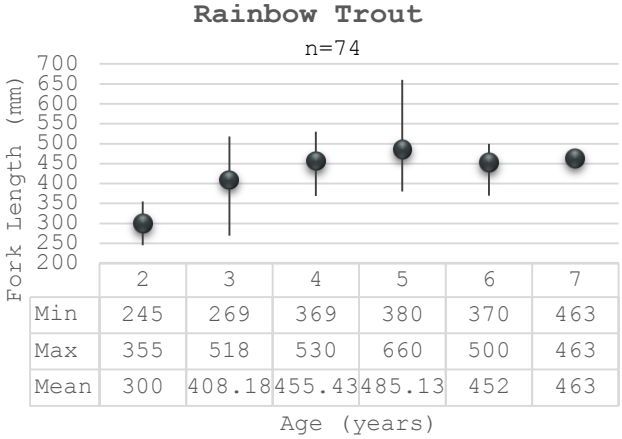
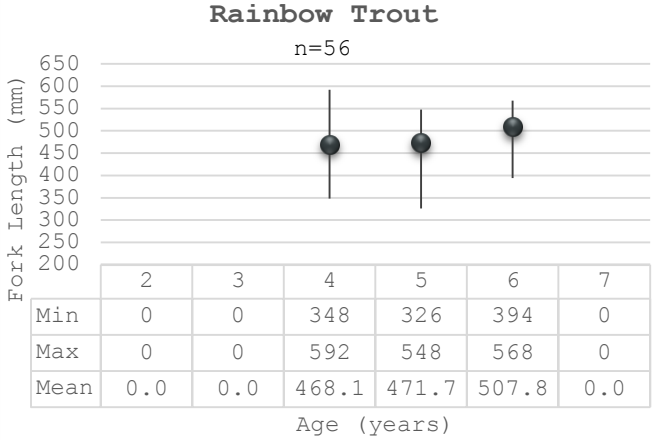


Figure 10: Length frequency comparison of rainbow trout in 2016 & 2017

In terms of rainbow trout, a total of 89 different individuals were captured along with recaps from 2016 tagged trout(n=13) with some individuals caught multiple times. The average length of rainbow trout was 466.1 mm and 32% of the catch were master angler size (Figure 4). Aging analysis indicated a strong year class at age five. On average, five year old rainbows were 471.7 mm in length (Figure 6). Some rainbows reached master angler size at age four. When comparing the two years of data, on average rainbow trout reach master angler size(51 cm) by age five or six.



	2	3	4	5	6	7
Min	245	269	369	380	370	463
Max	355	518	530	660	500	463
Mean	300	408.18	455.43	485.13	452	463



	2	3	4	5	6	7
Min	0	0	348	326	394	0
Max	0	0	592	548	568	0
Mean	0.0	0.0	468.1	471.7	507.8	0.0

Figure 11: Comparison of size ranges of rainbow trout in 2016 & 2017

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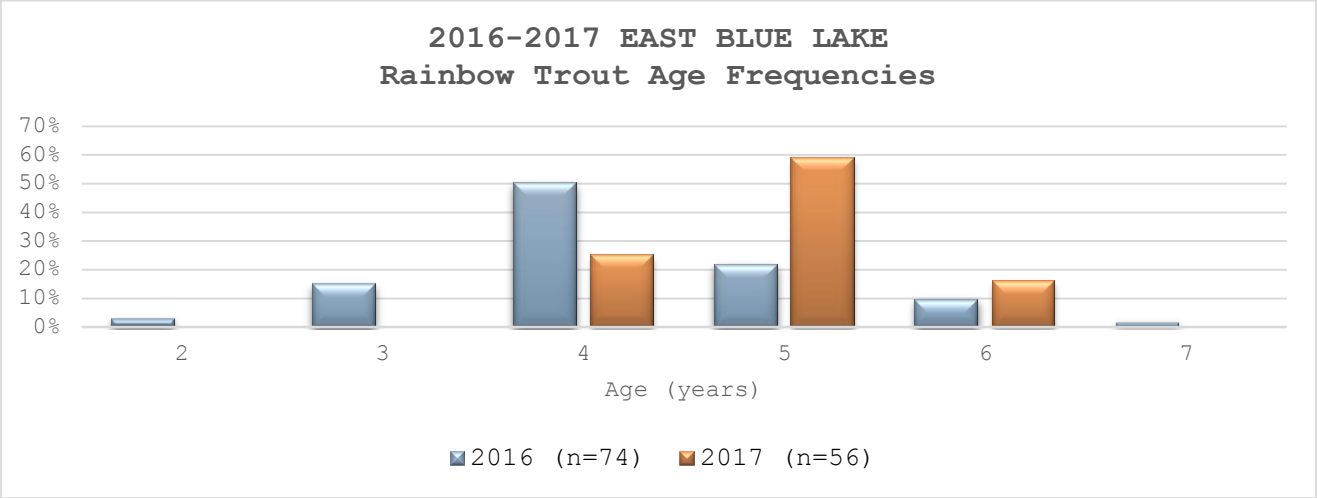

Figure 12: Age frequency comparison of rainbow trout in 2016 & 2017

Rainbow Trout cont'd: Following the trend of last year, the planting of either the spring stocking of 18+cm rainbows in 2013 or the fall stocking of 12-15cm in 2012 remain as the strong age class contributing to 59% of the trout aged in 2017. Generally trout stocked in the spring are 18+cm (1+ years old) and trout stocked in the fall are 12-15cm (0+ years old). This is the case for rainbows stocked from 2011-2017.

Table 4: 2011 – 2017 Stocking records for East Blue Lake

Rainbow Trout Stocking Condition & Rate Comparison by Year					
Year	Stocking/ Plantings	# Fish/Kg	# Fish Stocked	Total Stocked/Year	# Fish Stocked/hec
2011	spring	?	8,300	48,300	472.60
	fall	?	6,000		
	fall	?	34,000		
2012	fall	97.3	12,000	19,500	190.80
	fall	85	7,500		
2013	spring	28.8	5,000	30,000	293.54
	fall	120	25,000		
2014	spring	36	6,000	31,000	303.33
	fall	117	15,000		
	fall	89	10,000		
2015	spring	13	1,400	15,400	150.68
	spring	20	4,600		
	spring	20.5	2,400		
	spring	20.5	7,000		
2016	spring	12	4,540	19,460	190.41
	spring	12	1,620		
	spring	12	2,500		
	spring	12	5,400		
	spring	12	5,400		
2017	spring	24	13,000	14,000	136.99
	spring	27	1,000		

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Discussion:
Stocking practices and success in East Blue lakes has been a topic of discussion since the early 80s. Unlike many of the other trout lakes in the Duck Mountains, East Blue lake differs in species composition and morphology. Many factors influence stocking success; angling pressure, competition, size of fish, rate, strain, predation, method of stocking (shore versus by boat) and stocking time of year (spring versus fall).

There has been debates over the years to which stocking practice; "spring versus fall", create a better quality rainbow trout fishery for East Blue Lake. Shetter 1947, stated "spring release of adult/near adult hatchery reared rainbow is more desirable than the fall planting of similar age". Hudy 1980, found "regardless of strain, spring stocking was superior to fall stocking in survival to the creel". Johnson 1978, stated " rainbow & brookie stock as yearlings (~8") have shown a higher survival and have often produced a fishery in spite of the presence of other fish populations… however is expensive and generally not recommended." moreover he suggests " fingerling trout stocked in the fall are subject to only a short period of predation before freeze up and fish surviving to the following spring are apparently not as reduced by avian/mammal predation."

Figure 13: Rainbow trout stocking at East Blue Lake

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Discussion cont'd:

A recent literature search interestingly found a creel census conducted by H. Valiant & T. Smith on a few Duck Mountain Lakes in 1983. Their findings for East Blue Lake are intriguing… "One of the main reasons for the lower returns of younger fish appears to be the predation by birds, specifically loons mergansers and blue herons". In addition, it was estimated "trout harvest by loons in East Blue in 1982 was 3,454 fish or 35% of all yearling trout stocked that year. Significantly fewer yearling rainbows survived the summer compared to the other two species and it seems likely because the rainbows occupy shallower, warmer water than splake/brook trout do, that they are more susceptible to bird predation." Furthermore, Valiant & Smith found poor performances in all trout species stocked in East Blue and attributed it to the underlining difference that lake trout are present in the population. Their final recommendation was to either 1) reclaim the lake, 2)establish a catch and release fishery or 3) restricted limit fishery in order to maintain an adequate number of catchable sized fish in the lake. Fortunately, the fishery now holds a maximum trout limit of three for a regular license & two trout for a conservation, compared to the former daily limit of six back in 1983.

Contrary to the 1983 findings, it was suspected spring stocking has been more effective than fall, due to merely the size of fish being stocked and the opportunity for growth in the first few months. The 2015 summary, correlated stocking records with master angler submissions, suggested spring stocking at a rate of 15,000 1+ rainbows per year (~150/hec), contributed to successful angling years. It also advised exclusively spring stocking success would be apparent in master angler submissions/angler surveys between 2018 & 2020.

Figure 14: Rainbow trout sampled during removal program

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Unfortunately, with the consistent shift in past stocking practices (number of fish, size of fish and time of year), to date, it is difficult to verify whether one practice is better than the other. It is evident, stocking success in East Blue is influenced by numerous factors and currently, the white sucker influx is just another challenge to work into the management strategy. Future surveys will reveal more light on the success of scatter stocking 18+ bows in the spring, as this has been the current stocking practice since 2015. It is recommended to collect an age of all rainbows caught in future white sucker removals and mark fish by a simple fin clip to identify strong age classes. In addition, incorporate the estimated fish mortality due to bird predation from 1983 into stocking strategies. This evaluation will aid in future stocking plans and in the debate of "spring versus fall".

In terms of the removal program, the white sucker removal should continue as a significant population still exists. The program is effective in catching large quantities of fish and efficient as it takes little time to collect fish from the traps and can be completed in correspondence with other projects within the Ducks. Future hurdles to the removal include; 1) annually sourcing a market to repurpose the suckers and 2) achieving the target white sucker composition.

Market - Public/angler demand only contributes to a small portion of the removed fish. Commitment from local farmers must be in place prior to each removal.
Target - In 2016, a goal to continue the program until the white sucker composition was 25% or less was imposed. White suckers can constitute half or more of the total fish biomass in lakes (Lalancette 1977; Trippel and Harvey 1987; Chen and Harvey 1994). With little change in the composition over the two years (96%), achieving a target of 25% composition is probably unlikely. Instead, SVSFE suggests to monitor sucker populations by CPUE. At this time, a target of two white suckers/hour of trap netting was agreed upon. It is recommend to replicate the program in 2018 as populations are still quite significant. Following future efforts, managers should be able to identify effectiveness of the program and success of spring stocking

Figure 15: Temporary holding pens for white suckers

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Acknowledgements:
Projects like this could not be completed without continued partnerships, financial support and assistance from the various organizations/individuals who continually back up SVSFE; in this project - Intermountain Sport Fishing Enhancement Inc, Fisheries & Wildlife Enhancement Fund, Manitoba Sustainable Development staff – Fisheries and Parks Branch, the Whiteshell Fish Hatchery, East Blue Lakes Resort, cottage owners and the anglers. An extra shout out to Initial Attack crew who happened to be driving by at the right time and helped load 2.6 tonnes of fish into the transport truck. Couldn't of worked out any better. We thank you all.

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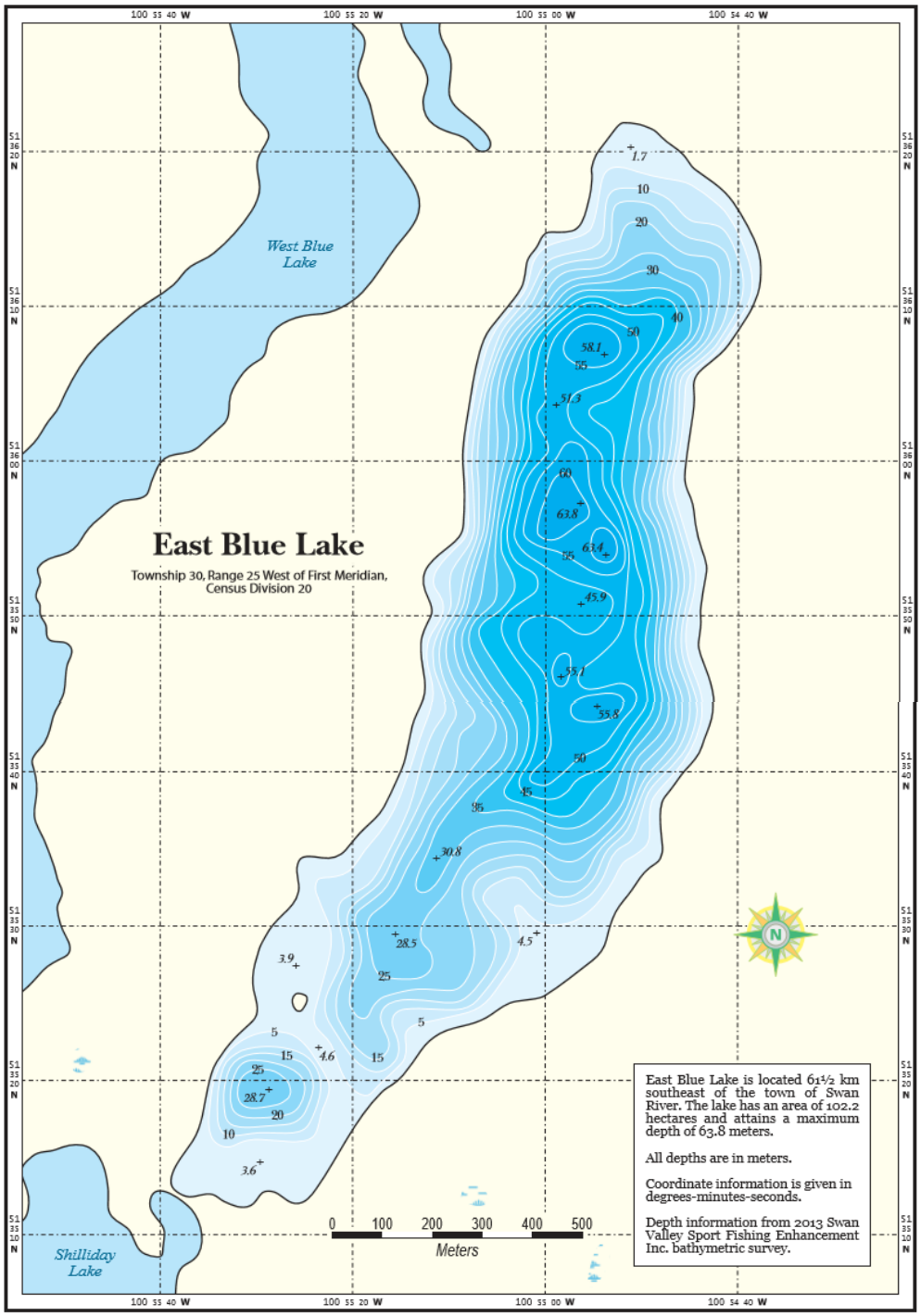

Figure 16: Depth Map of East Blue Lake. Targetable net locations on the north end of lake

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