Summary of Activities

Date: September 30, 2015

To: **Ian Kitch**
Conservation & Water Stewardship
Cc: Lloyd Rowe, Jonathan Stephens
Blue Lake Cottage Owners
Blue Lakes Resort – Arch & Dawn Dowsett

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Subject: East Blue Lake Stocked Trout Assessments

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

Summary of Activities: With a rising concern regarding the degrading fishing quality (specifically rainbow trout) in East Blue Lake, SVSFE technicians further investigated the concern in the field season of 2015. First of all, a short comparative brook trout index netting program (BTIN) was conducted in June 2015, an electrofishing session was conducted on the evening of September 8th, one short forage assessment was collected in late August, ongoing angler interviews were carried out through the open water season, and a literature/historical records review occurred in October. Results are as follows:

BTIN: SVSFE has used Brook Trout Index Netting (BTIN) protocol to assess stocked trout waters in the area since 2010. Regarding East Blue Lake the protocol was conducted in the summers of 2010 and 2011. For comparative measures, the study was replicated in 2015. In summary, a total of 30 randomly located nets (3-panel 2" and 2.5") were set for 30 minutes intervals each representing two stratums of the lake (shallow and deep). The overall objective is to determine a CPUE that is representative of the entire lake above the 10 metre contour. The objective, in our case was to determine and compare both CPUE and species composition over the three years of index netting (2010, 2011, 2015).

In terms of CPUE for rainbow trout, no conclusions were drawn. It appeared that rainbow trout CPUE increase from year to year however nearly all these rainbow trout were "fresh stockers" and correlated with assessments being conducted directly following rainbow trout stocking. It has been suggested that using BTIN as a East Blue Lake assessment method be ceased at this time, as it is believed to not accurately represent rainbow trout populations. This is especially supported because of discussions with anglers who had been able to catch and retain harvestable size rainbow trout throughout this summer of 2015.

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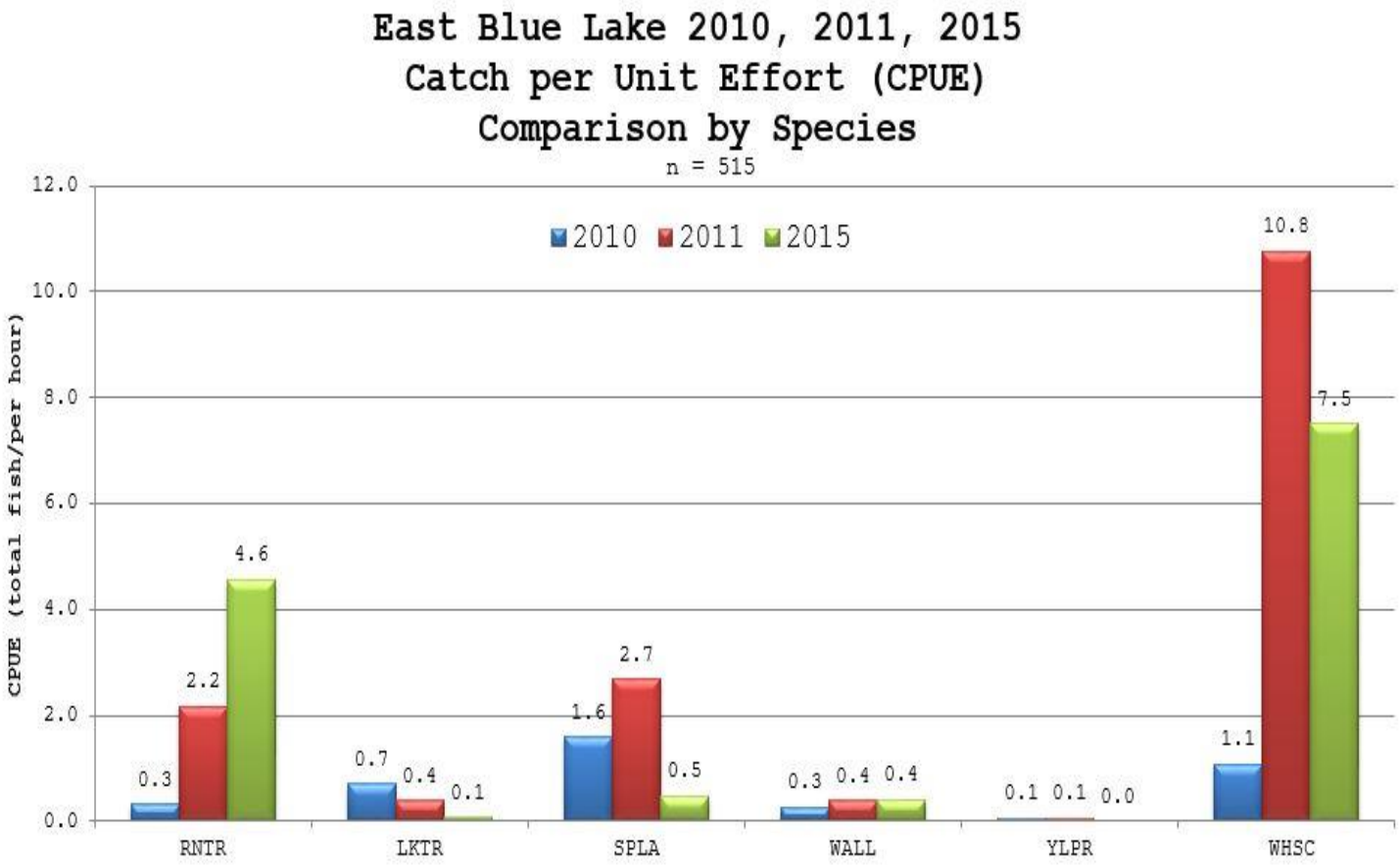

Figure 1: BTIN Species CPUE per Year

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BTIN Cont'd: In terms of species composition and CPUE of other species, one notable trend can be drawn (Figure 1 - Page 2). There appears to be a recent increase in white suckers. White sucker composition has increased from 27% (2010), to 66% (2011), and 58% in 2015. Numbers are similar to the 2014 trap netting assessment completed by Fisheries Branch assessment (69% white suckers). It is interesting to state that the increase in white suckers correlates perfectly with the recent high water in East Blue Lake which was documented to start rising in the fall of 2010. If white sucker composition proves to be an important parameter to keep and eye on, it is suggested that the BTIN protocol be used to do so for comparative measures. With regards to other species CPUE and composite numbers, other salmonid catches were lower, but no real conclusions were drawn at this time.

Electrofishing: Electrofishing was used to compliment BTIN and also to experiment with how the method works to assess rainbow trout abundance in deep clear lakes. Overall, not too many conclusions were drawn from this short assessment. While "sampling" it appeared although the electrofishing boat was hugging the shore and sampling in the shallowest possible areas, most fish were too deep to become affected by the electrification; suggesting the method is not ideal for assessing this lake. It is interesting to state that of the very few trout captured, one short transect along the east shore (depths 2.5-3m) yielded the most fish totaling one splake and four rainbow trout, including 4-6 trout which were missed. This area differed from other areas sampled as it represented an abundance of submerged fallen trees and woody debris. It has been hypothesized that these high catches could be directly associated with trout feeding on baitfish (yellow perch) utilizing the abundance of fish cover in this particular area.

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Seining/Stomach Contents: A very short (50 meter seine) forage investigation was conducted in late August 2015 to expand East Blue Lake database. It is important to state that forage was not/is not a concern and this assessment was only to gather a greater understanding of East Blue's fish community. Catchment included longnose dace (71%), common shiner (22%), and black-sided darter (7%). Presence of crayfish and caddisfly were documented as well. Yellow perch also provide an important forage base in the lake. Rainbow trout diets were analyzed during BTIN through regurgitation of recently eaten forage and found very high numbers of young of the year yellow perch. Rainbow trout stomach contents were also analyzed from helpful anglers which again, yielded dozens of very small yellow perch. Interestingly, earlier in June of 2015 rainbow trout stomachs were analyzed and remnants of gammerus and snails were identified.

Angler Interviews: SVSFE summer student, Megan Paterson conducted angler interviews throughout the Duck Mountains and Porcupine Hills from May 2015 until the end of September 2015. The final report and analysis of data from the angler interviews are still pending, however; there are a few notable opinions regarding East Blue Lake that should be addressed in this summary. First of all, the white sucker abundance has been a noted concern in a total of four angler interviews; all of which suggest the removal of the suckers. Also, two suggest increased assessments in the lake, two suggest increased stocking, two suggest imposing boat restrictions, and as expected, one suggests lowering water levels in both Blue Lakes. These trends are interesting, and it is suggested that further investigating these concerns in a ecological manner would be beneficial.

Lake Levels: High water has been an ongoing conversation between lake users, lake managers, parks staff and Blue Lakes Resorts owner's Arch and Dawn Dowsett since the lake began to rise in 2010. Common discussions revolve around property damage, standing dead trees, loss of recreational areas, and loss of business. Through browsing historical records, it appears that the lake naturally fluctuates at extreme levels however the major concern is the time frame in which the lake will decrease to its "regular" level. We discuss the concept of lake level because declining fishing quality, and also the increasing abundance of white suckers interestingly correlates with the water level rise in late 2010.

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Literature Review - Rainbow Trout Stocking: When managing any fishery, managers need to consider creel returns/master angler success and their correlation with stocking practices. The direct feedback received from anglers is a main factor why East Blue is on the radar today. To illustrate this correlation, the stocking history and reported master angler submissions have been plotted by year (Figure 2 - Page 5). Time of year and size of fish when stocked are important factors to consider when evaluating stocking success, therefore are included within the figure.

There are definite patterns/responses to changes in stocking practices from either fish size, time of year and/or number of fish stocked. We assumed angling returns from stocking were effected 3 – 6 years thereafter, as this is approximately when rainbows would reach master angler size (depending on age of stocked fish). Following are general observations regarding stocking/master angler submissions figure (Page 5):

There was an instant result from the 1981 stocking of 700 4+ year old fish in 1984 with 59 records reported.

From 1980 to 1991, rainbow trout were stock primarily in the spring at the age of 1 and 2 years. Within this timeframe there were nine years, 1982-1990, where stocking alternated years and numbers remained below 10,000 fish annually. Angler awards between 1990 and 1996 remained fair and consistent with an average of 45 masters caught per year, marking the longest positive trend in master angler reports.

In 1997, there was significant increase. This could be an effect from heavy spring stocking of 1+ and 2+ trout in 92’ and 93’. Interestingly, following this dramatic incline is the substantial decline for years to follow. There are many factors which may have played an influence including; angler pressure, fish mortality due to increase in competition, size of fish stocked (12-15cm), predation on these smaller fish, method of stocking (shore versus by boat) and change in time of year (fall versus spring).

It isn’t until 2006, when angler awards appear to ‘bounce back’, followed by a record year in 2007 of 110 masters reported. This is merely three years after spring stocking of larger fish was implemented after six years of exclusively fall stocking. But again, this record year is followed by a considerable decline in master angler reports of rainbow trout, which continue to the present day. With this pattern in both 1997 and 2007 it is believed that the trout populations can only handle a short period of heavy spring stocking (>15,000 fish/year) compared to the fairly stable trend of master angler returns received between 1990 and 1996 when stocking rates were lower (<15,000/year).

Current stocking plans consist of spring stocking 18+cm rainbows. It will be interesting to evaluate the master angler records in 2018 to 2020 to see if the hypothesis of this stocking trend continues.

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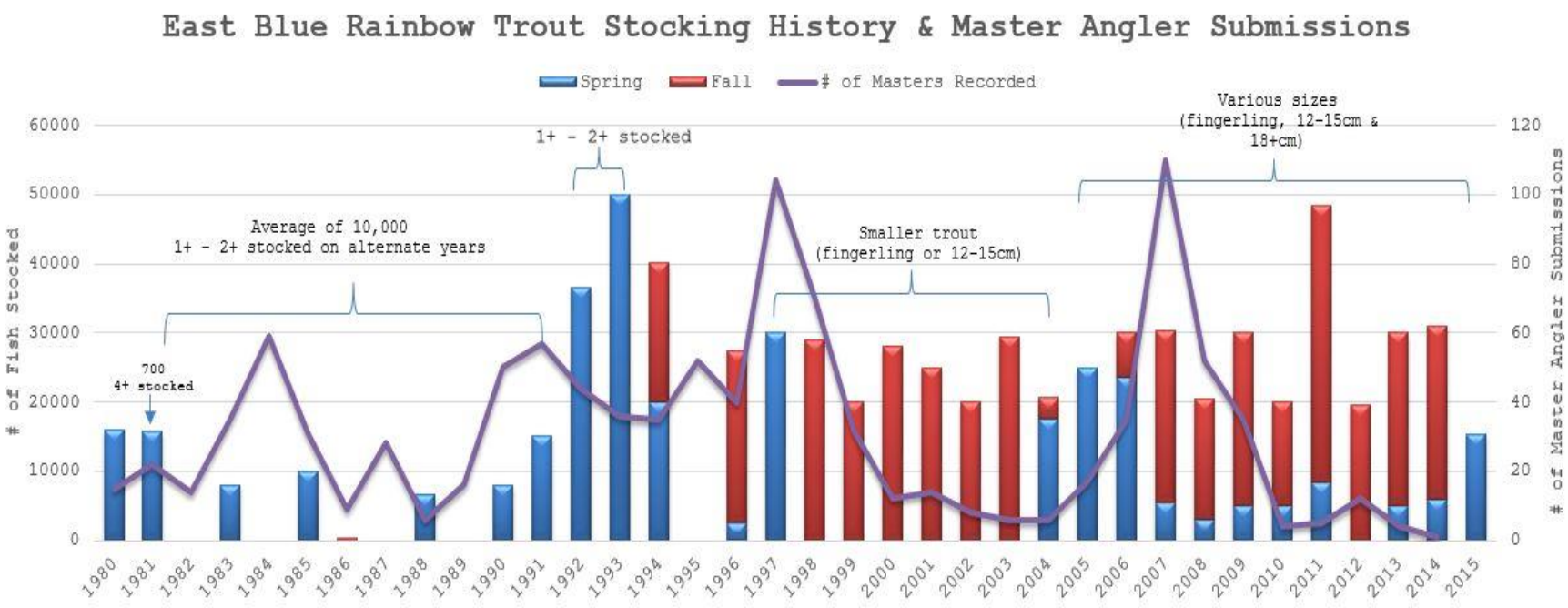

Figure: East Blue Stocking History and Master Angler Submissions for Rainbow Trout

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Suggestions/Recommendations:
In terms of East Blue Lake it appears that far to many factors interestingly correlate with the recent decrease in rainbow trout angling quality. Following are aspects that should be considered and/or is currently implemented in the future management of East Blue Lake.

Monitoring: It appears that current monitoring methods of East Blue Lake are not representative. BTIN has proven to not accurately represent stocked rainbow trout composition, and therefore should be discontinued as the appropriate method for evaluating rainbow trout stocks. In terms of electrofishing, it has also been determined as an insignificant monitoring method. The lake's lack of accessible littoral area has proven to be problematic in regards to capturing all cohorts of stocked trout. Perhaps electrofishing during cooler temperatures (either early spring or late fall) could be a considered method in the future. Trap-netting has also been a insignificant method due to lack of ideal depths for sampling. At current, it is suggested that monitoring be conducted through closely monitoring angling success through either voluntary creel, barrel counts, monitoring the master angler awards, and "keeping in touch" with Blue Lakes Resort - Arch and Dawn Dowsett, who are a great asset in terms of monitoring angling quality in the lake.

Fish Cover: At current, fish cover in terms of standing trees is extremely abundant in East Blue Lake. However, one could argue that a fallen tree provides fish significantly better fish cover than a standing tree. When the lake level recedes back to "historic levels" fish cover may become a concern. Fisheries Branch Dauphin has put together a very comprehensive argument suggesting a need for increased fish cover in East Blue Lake in terms of fallen trees. It states felling trees would not only increase fish cover but would also in turn result in helping aid/speed up natural progression of nutrient transfer from land to water. This idea is supported as increasing fish cover and primary productivity would no doubt benefit the system, however further investigations on advantages and disadvantages should be considered before the felling any of trees. An interesting observation, as described earlier, was the abundance of trout captured during electrofishing over a very short transect consisting of a high abundance of fallen trees. For more information regarding East Blue Lake and fish cover please contact Fisheries Branch in Dauphin.

Stocking – Time of Year: First of all, Fisheries Branch staff suggests a "switch" from the current spring & fall stocking program to a <u>spring only</u> stocking program. According to Kerr (2000) there are endless peer-reviewed case studies that suggest survival is greater with spring stocking rainbow trout as opposed to fall-stocking. This phenomena has been documented time and time again through various scientific methods and creel surveys. Fall stocked rainbow trout generally survive poorly (O'Bara & Eggleton 1995). This has been attributed to the fact that they may not disperse as readily and that overwinter mortality is extensive (Needham 1959).

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Suggestions/Recommendations Continued:

Stocking – Frequency: In terms of stocking frequency, the best approach depends on the stocking objective (Kerr, 2000). In situations where establishing a longer term (i.e., put-and-delayed-take fishery) is the goal, annual or alternate year stocking is probably more appropriate (Kerr, 2000).

Stocking – Methods: In terms of stocking methods, the approach of scatter stocking is preferred. This method is currently conducted by fisheries branch when assistance is available but not implemented as a mandatory practice. Meuller and Rockett (1961) reported that predation on rainbow trout was significantly less when fish were released over deep (e.g. 12-18m) water sites. Through partnership, Fisheries Branch along with SVSFE technicians & stocking committee will make certain this practice is completed to increase stocking success.

Stocking – Rate & Size: It is suggested to lower the rate of stocking. Many believe stocking more will return high angling results, but this is not the case. Overstocking can also result in slow growth and reduced condition (Bailey, 1958). Overall, it is better to understock than to overstock (Brown and Thoreson, 1958). There are several rates recommended by various departments in Canada and the United States which all include different influencing factors to weigh out. Few to mention; Michigan, recommends 2-25 yearlings/acre (5-62 fish/hectare) in large, oligotrophic lakes with multi-species (1977, MDNR), while Ontario stated 350 yearlings/hectare of water <6m (for water possessing TDS>100mg/L)(1982, OMNR). Note both rates equate to far less than 10,000 fish annually. It was also suggested to stock fish at a greater size; with an ideal size being 18cm or greater. There have been various studies conducted regarding stocking size and classifying fisheries, which in most cases relate specifically to the fish community and presence of predators and/or competitors. In this case walleye are a prevalent predator, and white sucker are a prevalent competitor. Further discussions are required to develop the best suited stocking rate for rainbow trout in East Blue Lake, but through literature, it appears the rate for rainbow trout stocking should not exceed 10,000 yearlings(18+cm) per year or 100 yearlings per hectare.

Suggestions/Recommendations Continued:

Lake Maintenance: The province of Manitoba invests dearly into the current trout program which attracts anglers from far and wide. It has been recently identified that some of these waterbodies require specific maintenance programs in order to continue to grow big fish. More specifically, the problems have been directly associated with invasions of competitive/predatory species as a result of either high water, human fowl-play or the transportation of adhesive eggs or fish via avian migration. For example, this has been noted in multiple FLIPPR lakes including Tokaryk and Patterson, as well as local lakes including Two-Mile and Gull where yellow perch have basically over-run these popular trout fisheries and in-turn decreased fishing quality significantly. In terms of maintenance; removal programs of these predators/competitors have recently been suggested and in one case implemented. For example, in September of 2015 fisheries staff conducted a week long perch removal program on Tokaryk Lake to help facilitate stocked trout growth and survival. The idea here is to identify negative relationships detrimental to stocked trout and implement maintenance programs to help aid and eliminate these negative relationships.

In the case of East Blue, it has been recently identified that white suckers may be detrimental to the survival of rainbow trout in the current system. Looking back on historic data, we notice no evidence of white suckers in the fish community. Conversations with long-term lake users the common theme is "there were never suckers in this lake", or "as far back as I can remember, I've never seen so many suckers". It is not believed that white-suckers are new to the ecosystem, however it is believed that sucker recruitment has increased significantly with the creation on new habitats directly associated with recent high water periods. Regardless, today nearly 3/4 of the specious composition consist of white-suckers which is a growing concern.

Several studies have demonstrated a negative relationship between white suckers and rainbow trout (Kerr, 2000). The diet of rainbow trout, white-sucker and longnose sucker was found to overlap considerably in Paine Lake, Alberta (Barton and Bidgood, 1979). Bidgood and Barton (1982) noted that the presence of suckers resulted in decreased growth rate of stocked rainbow trout. Alexander (1975) found survival of stocked rainbow trout was reduced after the introduction of white sucker in both East Fish Lake and Fuller Pond in Michigan. The was attributed to a reduction of benthos populations (Kerr, 2000). Upon literature review, it becomes apparent that there is significant information pertaining to the negative relationship between rainbow trout and white suckers. For more information a great literature review can be found on the OMNR website titled Rainbow Trout Stocking in Inland Lakes and Streams: An Annotated Bibliography and Literature Review by S.J. Kerr and T.A Lasenby, 2000.

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Suggestions/Recommendations Continued:

We did some further investigations regarding white sucker removal as a management objective in rainbow trout fisheries: Reesor Lake Alberta is managed as a rainbow trout fishery and corresponding decreased angling quality in 1978 test-netting indicated a 85% composition of white sucker (Bradford, 2004). It was determined that white suckers invaded that lake via an outflowing tributary. Managers suggested a full lake reclamation as suckers compete with trout for food and are considered detrimental to trout production (Bradford, 2004). A chemical reclamation removed white suckers in 1979. Success was monitored through creel census. In 1984 the catch rate was significantly higher (0.22 trout per hour), than in 1979 (0.05 trout per hour) which was conducted before the suckers were removed from the lake (Bradford, 2004).

Another "successful" white sucker removal program on a rainbow trout fishery was conducted on Twin Lake, Alberta in 1991 (Government of Alberta, 2014). A similar program was conducted on Lake Tanycomo, Utah in the 1980's. And again, yet another successful "biomanipulation" program of white suckers was conducted in a brook trout fishery in Maine (Obrey, 2014). Please refer to literature cited for further information if required.

At current, SVSFE strongly recommends that a trout maintenance program be initiated on East Blue Lake. We confidently suggest that a program such as this would decrease competition upon younger trout, and ensure trout growth/survival to "catchable sizes". In 2015 there were reports of anglers catching suckers through both trolling willow leafs, and using lindy rigs. Evidence that suckers are feeding so aggressively further strengthens this argument. We believe that a program of this magnitude would not only be effective, but would also require very little effort.

In summary, SVSFE plans to work closely with Fisheries Branch and relevant parties to cooperatively develop future management plans for East Blue Lake. It is recommended to include/review the following during discussions;

(1) Monitor rainbow trout angling success and fish stocks through barrel counts & voluntary angler surveys. Other species could be monitored via periodic netting/electrofishing surveys (ie. splake, walleye & white sucker populations)
(2) Review advantages and disadvantages of tree felling to increase fish habitat
(3) Review and determine suitable stocking rates for rainbow trout and continue the implementation of annual spring scatter stocking of yearling trout (18+cm)
(4) Initiate a white sucker removal – maintenance program.
(5) Conduct a comprehensive literature review on East Blue historical records

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