Responsiveness Summary

Buffalo Reef Draft Preliminary Alternatives Analysis Report

The Buffalo Reef Draft Preliminary Alternatives Analysis Report was on public notice from February 5 to March 8, 2019. The report briefly outlines 13 alternative strategies for managing the migrating stamp sands that threaten Buffalo Reef. Public comments were solicited on whether there are additional management strategies the Buffalo Reef Task Force (BRTF) should consider and whether any adjustments to the management strategies or risks described in the report should be considered. The BRTF received 27 comments via email and letter. Most commenters supported the alternative of stamp sand disposal into the White Pine Mine tailings basins. Several commenters provided intriguing alternatives beyond those that the BRTF had provided in the report. Below is a summary of comments received during the public notice period. In preparing this summary, actual comment language may have been abbreviated, paraphrased, and/or edited for clarity. The BRTFs responses follow the numbered comments. The BRTF appreciates the time of those who responded during the public comment period.

1. **Comment** – Bring in heavy dredgers and open barges and a sand auger used in mining out West to pump the sand into abandoned mine shafts.

   Response – Although this option results in minimal surface disturbance, it was considered as high risk for several reasons. First, the shafts used in this type of mining were horizontal and followed the high-valued ore along the veins. The vertical shafts used to gain access to the mine do not have the dimensions to handle the required capacity. Filling along the horizontal drifts would need to be accomplished by conveyor. The volume of crushed rock forming the stamp sands is greater than the in-place rock that was removed from the horizontal shafts by at least one-third volume. This need for more space would require several mines to be re-commissioned. Re-commissioning the mines would entail that they be dewatered and refurbished to make them safe for human entrance.

   Second, once the mines are certified as safe for human entrance, an extensive engineering assessment to minimize the potential impact to the drinking water aquifers in the area would have to take place even though the disposal of stamp sands into the mines results in the placement of like material on like material. This risk could drive a continued need for monitoring after the mines are filled and could require periodic removal and treatment of the water in the mine driving up operation and maintenance costs in perpetuity. Geologically, it is possible that none of the mines being considered may be appropriate for filling for hydrological reasons; however, this may not be known until a mine is dewatered and an engineering assessment is completed.

Finally, the mine shafts would have to be purchased from mineral rights owners. Filling a mine with stamp sands would render any copper and other minerals remaining in the mines inaccessible, so the cost to purchase the mineral rights could be substantial.

2. **Comment** – The Michigan Department of Natural Resources has posted signs up and down the beach of Gay, Michigan, that read "Removal of Stamp Sands Prohibited." If the locals had been able to utilize these sands, they would not be washing into Lake Superior.

   Response – Approximately 22.7 million metric tons of stamp sand have been deposited off shore in Gay. The stamp sands have been placed on and migrated onto state bottomlands lakeward of the ordinary high water mark of Lake Superior. Removal of materials from the bottomland of Lake Superior requires a permit under the Natural Resources and Environmental Protection Act 1994 PA 451, Part 335, Great Lakes Submerged Lands. The amount of stamp sand greatly surpasses the needs of the local construction industry.

3. **Comment** – The proposed dredging is nothing more than a temporary "band aid." What would prevent the immense amount of stamp sands to again migrate and cover the reef in another 5-7 years?

   Response – Correct, the dredging operation that is set to take place in 2019 is a temporary measure to abate the migration of stamp sands. This will provide the BRTF with additional time to develop a long-term solution to this enormous problem while ensuring that any further damage to the reef is reduced.

4. **Comment** – How much would the repeated dredging cost if the stamp sands continue to migrate and cover the reef?

   Response – Right now the price per cubic yard is predicted to remain relatively steady if the current stamp sand placement area is used. However, given that much of the stamp sands are already in the water, the frequency of the dredging may need to be adjusted to account for the severity of the storms during the summer and the length of the ice pack in the winter. The dredging that is occurring in 2019 will be used as a benchmark to inform the BRTF where and when additional dredging should occur.

5. **Comment** – Build a pier into the lake near Gay to permanently contain the stamp sands.

   Response – Building a pier would not "permanently contain" the material. This concept is demonstrated by the break wall at Grand Traverse Harbor. The break wall is effective at temporarily delaying the migration of material, but there is evidence that material is starting to migrate around and over the structure as littoral drift carries the material down drift of the original pile. However, there is an alternative that considers constructing a revetment partially around the material to prevent further erosion due to

wave action. The revetment would be constructed in such a manner to allow for additional material to be placed behind the structure as needed in the future.

6. **Comments** –
    - If the original slope configuration of the beach cannot be restored, what guarantees can be provided to the property owners that their properties would not be adversely impacted by the removal of stamp sands?
    - Do the people making decisions have the expertise to determine the original beach slope configuration and at the same time leave enough shore to protect septic systems legally installed?

    Response – If the selected alternative involves removing stamp sands in areas where there is a potential to cause damage to private property, the final slope configuration would intentionally be analyzed as part of project planning.

7. **Comment** – Removal of the stamp sands would increase flooding as happened in October 2017 and reduce ice shove protection.

    Response – The BRTF agrees that removal of stamp sands will change the characteristics of the beach and will affect wave height and flooding during storms. However, stamp sands do not provide increased protection from wave-induced flooding. Extensive research on the topic by Dr. Robert Regis of Northern Michigan University clearly indicates that the removal of stamp sands along the beach, with the creation of a natural beach slope would increase protection for properties during storm events.

    The rapid influx of stamp sands has caused beach profiles to become much steeper than they are in natural sand beaches. Breaker and surf zones have narrowed and moved much closer to the shoreline. As stamp sands continue to be deposited along the shoreline, the beach will continue to widen, the beach face will become steeper, and wave heights will increase. In fact, the property damage that occurred in October 2017 was a consequence of stamp sands altering the beach profile.

    The issue of increased protection for properties from ice shove events is less understood. Removal of stamp sands from the impacted beaches may reduce ice shove protection but the risk of ice shove would become like what it is at the natural sand beaches south of the harbor.

8. **Comments** –
    - Can’t someone take the plastic out of the oceans, and take the stamp sands, mix it all together and come up with new asphalt and start repairing our roads?
    - Mix it with concrete and use it to replace roads.

    Response – Approximately 2,816 acres of aquatic habitat have been impacted by migrating stamp sands. Encapsulating this area with concrete would not restore fish

spawning sites or young of year nursery areas. Moving and encapsulating the above water stamp sands is a component of several of the alternatives. Attempting to harvest plastic from the oceans would dramatically increase the cost of such an alternative. The idea of securing/encapsulating stamp sands within concrete or some other inert substance has also been proposed by two companies with some degree of capability to undertake the approach.

9. **Comment** – Couldn't you pump it in a slurry to a nearby abandoned copper mine in a temporary pipeline?

   Response – Pumping material in a slurry is often used to move it short distances (under five miles) to placement areas that can accommodate the large volume of water that is required to move the material. This material averages about 10-25 percent efficiency meaning that you are moving anywhere between 75 and 90 percent water. The most cost-effective method to move the material to the nearby mines would either be by truck or conveyor.

10. **Comment** – Create an inland nursery using the waste and fill. Once it is leveled, plant fast growing trees to uptake and breakdown the chemicals. I have read about similar circumstances occurring at Chernobyl and in industrial waste sites.

    Response –One of the alternatives is to have the stamp sands moved to an inland area and a plan to have plants included as a long-term solution has merit. Annual soil testing to indicate the movement of toxins would be important in this scenario to monitor the effectiveness of the treatment and impacts to the surrounding area. There are two nearby areas, Torch Lake and Sand Point, which hold stamp sands that could be used as a reference on how the combination of stamp sands, soil, and other media such as wood interact with plant growth. Both areas had a soil cap placed over the stamp sands rather than mixing. There is considerable cost to finding and moving the soil to be used with stamp sands and a concern that seeds of invasive plant species may be included. Also, there are concerns as to the impacts to nearby habitats.

    In the Sand Point area, successful plantings have included the herbaceous perennials such as milkweeds, *Coreopsis* sp., Canada vetch, and big and little bluestem. The grasses seem to have good resilience and more tolerance to the toxins in the stamp sands and their rooting structure is very stabilizing. Tree species planted have not had long-term success. Although they are not native plants, the nitrogen-fixing birds-foot trefoil and alfalfa have proven to be good starter plants on the stamp sands. Over time they would succeed to other species. Through wind action and the movement of sand by ants, there has been some mixing of stamp sands and soil. In these areas, there are some lichen species that have grown. There are some lichen genus' (*Cladina* sp., *Stereocaulon* sp., *Trapeliopsis* sp., *Cladonia* sp.) that would readily colonize over the stamp sands, if fragments of the lichens could be spread over the site, beginning a slow restoration. There is also a possibility, but not tested, that fiber hemp would grow on the sands – it is

an annual plant, they would take up toxins, and as the plants are processed into fiber (and not as an edible) there would be no concern about negative consequences from consuming or extracting medicine from them.

11. **Comment** – What about securing/encapsulating the stamp sands where they are underwater? You could use underwater concrete. The concrete could also be used to construct underwater barriers or channels that might help prevent future spread of stamp sands. The beach sands could be encapsulated in a nearby location.

    Response – Approximately 2,816 acres of aquatic habitat have been impacted by migrating stamp sands. Encapsulating this area with concrete would not restore fish spawning sites or young of year nursery areas. Moving and encapsulating the above-water stamp sands is a component of several of the proposed alternatives. The idea of securing/encapsulating stamp sands within concrete or some other inert substance has also been proposed by two companies with some degree of capability to undertake the approach. However, economic and environmental ramifications related to such a strategy exclude it from further consideration in the alternatives.

    Economic: Although stamp sands located both in the water and onshore contain metals and constituents of concern, they are not defined as "hazardous" under state of Michigan rules (they are already being spread on roads or used for fill, etc.). Therefore, encapsulating the stamp sands is not necessary with respect to regulations or permitting. Doing so would increase the costs way beyond other alternatives already being considered. The immense quantity of stamp sands and their distribution across five miles of beach and thousands of acres underwater add additional costs and complexity to the encapsulation potential.

    Environmental: There would be many environmental problems and concerns with encapsulating the stamp sands in place. The process and result of encapsulation would likely be more deleterious ecologically than just leaving the sands in place (the no action alternative). Among other things, there would be extensive loss of habitat, biological production, fish spawning availability, beach use, etc.

12. **Comment** – Haul the stamp sands to Mt. Bohemia northeast of Grand Traverse Bay and pile them up to form a junior peak, or sand cone. Once capped and vegetated it would add some interesting and challenging winter sports terrain.

    Response – While an interesting proposal, if an alternative is selected that included disposal of stamp sands in a constructed landfill, transport distance (nearly 22 miles) and difficulty finding available property would pose significant barriers.

13. **Comment** – Fill a gorge and valley with stamp sands and create a new campground, roads, and a landing strip.

Response – The BRTF is exploring opportunities for the beneficial reuse of stamp sands that accomplish the goal of removing them from incompatible environmental settings. As indicated in the Alternatives Assessment document, there are abundant concerns with chemical contamination in areas where stamp sands are deposited. Furthermore, areas where stamp sands are the primary component of the soil are unable to support healthy vegetation.

Gorges and valleys in the Keweenaw Peninsula are areas of significant biological and esthetic value. Depositing stamp sands into these areas would increase the areas of contamination and destroy valuable and largely unimpacted regions of the peninsula and would lead to the types of environmental and social problems that the BRTF is trying to solve in the Grand Traverse Bay Area. The filling of gorges and valleys alternative in neither reasonable nor permittable.

Prepared by the Buffalo Reef Task Force, April 2019