Environmental Assessment and
Finding of No Significant Impact

Water Chestnut Control Research and Demonstration Project

Lake Brittle, Fauquier County, Virginia

DRAFT – MAY 2025

U.S. Army Corps of Engineers, Baltimore District

Draft FINDING OF NO SIGNIFICANT IMPACT

Water Chestnut Control Research and Demonstration Project in Lake Brittle, Virginia

The U.S. Army Corps of Engineers (USACE), Baltimore District has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Final Environmental Assessment (EA) dated XX, for the Water Chestnut Control Research and Demonstration Project addresses the effectiveness of three aquatic herbicides to manage a newly introduced species of water chestnut, the two-horned water chestnut (*Trapa bispinosa* var. *iinumai*), in Lake Brittle, Fauquier County, Virginia.

The Final EA, incorporated herein by reference, evaluated various alternatives to conduct a demonstration project that will investigate the effectiveness of various aquatic herbicides on two-horned water chestnut in Lake Brittle, Virginia. The preferred alternative includes:

- Treatment of the aquatic invasive plant, the two-horned water chestnut, as part of the USACE Engineer Research and Development Center's (ERDC) Water Chestnut Control Research and Demonstration Project. The action will evaluate the effectiveness of three U.S. Environmental Protection Agency (USEPA)-approved aquatic herbicides, flumioxazin, imazamox, and florpyrauxifen-benzyl, to treat two-horned water chestnut in Lake Brittle, Virginia. Herbicide treatments will be conducted by a Virginia Department of Agriculture and Consumer Services licensed herbicide applicator in accordance with product labels. Treatment will be conducted in the early summer prior to the two-horned water chestnut going to seed (pre-emergent). The ERDC demonstration project will only be conducted for one season. The Virginia Department of Wildlife Resources (VADWR) may continue treatment following the demonstration project in order to continue to collect field data up to the point that the two-horned water chestnut is completely eradicated from the lake.

- Data and observations collected from the herbicide treatments and subsequent monitoring will provide valuable information for developing future guidance on how to manage two-horned water chestnut including the efficacy of certain herbicides, the optimal timing of treatment, the impacts on non-target species, and herbicide concentration exposure time requirements. The conclusions from this investigation will be used to develop treatment procedures to transfer to regional, state, and local agencies, and non-governmental organizations to use for effective control of two-horned water chestnut throughout Virginia and Maryland.

Monitoring will be done in conjunction with the herbicide treatment of two-horned water chestnut. Five permanent monitoring plots previously established by VADWR in the proposed treatment areas will be monitored twice during the growing season (July and September).

In addition to a “no-action” plan, five alternatives including the preferred alternative plan were considered. Four of the alternatives did not meet the purpose and need. Therefore, only the no action plan and the preferred alternative plan were carried forward and the potential effects were evaluated under NEPA. A summary assessment of the potential effects of the preferred alternative are listed in Table 1:

Table 1: Summary of Potential Effects of the Preferred Alternative

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Aesthetics	☒	☐	☐
Air Quality	☒	☐	☐
Aquatic Resources/Wetlands	☒	☐	☐
Anadromous Fish	☐	☐	☒
Cultural Resources	☐	☐	☒
Fish and Wildlife Habitat	☒	☐	☐
Floodplains	☐	☐	☒
Hazard, Toxic, and Radioactive Waste	☐	☐	☒
Historic Properties	☐	☐	☒
Hydrology	☐	☐	☒
Invasive Species	☒	☐	☐
Land Use	☐	☐	☒
Migratory Birds	☐	☐	☒
Navigation	☐	☐	☒
Noise Levels	☐	☐	☒
Public Infrastructure	☐	☐	☒
Recreation	☐	☐	☒
Socioeconomics	☐	☐	☒
Soils	☐	☐	☒
Submerged Aquatic Vegetation*	☒	☐	☐
Threatened/Endangered Species/Critical Habitat	☐	☐	☒
Tribal Trust Resources	☐	☐	☒
Water Quality	☒	☐	☐
Waterways and Hydrology	☐	☐	☒

*The preferred alternative is the management of aquatic vegetation.

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the preferred alternative. Best management practices as detailed in the EA will be implemented, if appropriate, to minimize impacts.

- All herbicide applications will adhere to USEPA label requirements.

- Pre- and post-treatment monitoring will occur to assess the efficacy of the herbicide treatments and non-target impacts.

- Monitoring will include collecting water quality data to ensure dissolved oxygen levels remain within an optimal range following target plant die-off.

- Treatment areas will be separated by a minimum of 66 feet (20 meters) (if possible) to reduce cross-contamination due to herbicide drift. In areas where mixed stands of non-target and target species occur, the appropriately selective herbicide will be used to provide more targeted treatment of two-horned water chestnut.

No compensatory mitigation is required as part of the preferred alternative.

Public review of the draft EA and FONSI was completed on **DATE DRAFT EA AND FONSI REVIEW PERIOD ENDED**. All comments submitted during the public review period were responded to in the Final EA and FONSI.

Pursuant to section 7 of the Endangered Species Act of 1973, as amended, USACE determined that the preferred alternative will have no effect on federally listed species or their designated critical habitat.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, USACE determined that the preferred alternative has no potential to cause adverse effects on historic properties.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on the EA, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the preferred alternative would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_____ _____

Date

Francis B. Pera
Commander and District Engineer
Colonel, U.S Army

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1 Introduction

The Water Chestnut Control Research and Demonstration Project is authorized by Section 104 of the River and Harbor Act of 1958, Public Law (P.L.) 85-500, as amended. Section 104 authorizes the Aquatic Plant Control Research Program (APCRP), which provides an expanded aquatic plant control program that supports the "prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from the navigable waters, tributary streams, connecting channels, and other allied waters of the Unites States." This includes continuous research into efficient and economical methods for aquatic plant control. The research is being led by the research branch of U.S. Army Corps of Engineers (USACE), the Engineer Research and Development Center (ERDC).

The two-horned water chestnut, first identified in the U.S. in 2014 in Virginia's Potomac River, was initially mistaken for the Eurasian water chestnut. However, further analysis confirmed it as a distinct species native to Taiwan, Japan, China, and Korea. It has since spread throughout the Chesapeake Bay's freshwater tributaries and the Roanoke River Basin in Virginia, where it grows rapidly, competing for resources and forming dense mats that outcompete native plants (Chorak et. al, 2019). The two-horned water chestnut was added to the Virginia Invasive Plant Species List as a Tier 2 (present in the Commonwealth and for which successful eradication or suppression is feasible) noxious weed in October 2024. This environmental assessment includes the evaluation of several management measures to reduce the two-horned water chestnut, within Lake Brittle, Virginia. The alternatives include mechanical removal, water level drawdown, benthic barriers, biological control, and chemical control.

2 Preferred Alternative

The preferred alternative involves treatment of the aquatic invasive plant, the two-horned water chestnut (*Trapa bispinosa* var. *iinumai*), as part of ERDC's Water Chestnut Control Research and Demonstration Project. The action will evaluate the effectiveness of three U.S. Environmental Protection Agency (USEPA)-approved aquatic herbicides to treat the two-horned water chestnut. Data and observations collected from the herbicide treatments and subsequent monitoring will provide valuable information for developing future guidance on how to manage two-horned water chestnut including the efficacy of certain herbicides, the optimal timing of treatment, the impacts on non-target species, and herbicide concentration exposure time (CET) requirements. The conclusions from this investigation will be used to develop treatment procedures to transfer to regional, state, and local agencies, and non-governmental organizations (NGOs) to use for effective control of two-horned water chestnut throughout Virginia and Maryland.

2.1 Location

This demonstration project is located in Lake Brittle, a 77-acre impoundment lake located in Fauquier County, Virginia and within the Broad Run Watershed of the

Potomac River Basin. The lake is located southeast of New Baltimore, Virginia, along Route 793. Lake Brittle was impounded in 1953 as a public fishing lake and is owned by the Virginia Department of Wildlife Resources (VADWR) (Figure 2-1). Lake Brittle identified as the preferred location by VADWR and ERDC to deploy an early detection-rapid response multi-agency approach with the goal of eradicating *T. bispinosa* var. *iinumai* in Virginia. Lake Brittle supports a warm water fishery of centrarchids (bluegill, redear sunfish, largemouth bass, black crappie), ictalurids (channel catfish), and percids (annually stocked walleye) – managed by the VADWR as an important recreational sport fish (Willis 2020). Other sites were ruled out in the selection process due to factors including water body size, extent of infestation, and property ownership and access requirements. Past and ongoing monitoring data completed by ERDC and VADWR already exists at Lake Brittle which will provide as a comparison during the demonstration project. Proposed treatment areas are located along the perimeter of Lake Brittle in shallow water less than 2 feet (0.6 meters) deep as outlined in Figure 2-2.

2.2 Treatment Methods

The preferred alternative will involve the direct application of herbicide to Lake Brittle to control populations of two-horned water chestnut that inhibit use of the lake for recreation and degrade aquatic habitat. Identified locations within Lake Brittle will have site-specific treatment plans based on site conditions including but not limited to water flow dynamics, water depths, and plant densities. The herbicides proposed for use are imazamox, flumioxazin, and florpyrauxifen-benzyl (Table 2-1).

Treatment of two-horned water chestnut by local governments and NGOs in Virginia and Maryland has shown that herbicides were effective in reducing two-horned water chestnut biomass. The results of these small-scale field efforts along with findings of comparative research trials of herbicides (Dodd et al., 2022) resulted in the identification of flumioxazin, imazamox, and florpyrauxifen-benzyl that will be evaluated in this field-scale demonstration.

Herbicide treatments will be conducted by a Virginia Department of Agriculture and Consumer Services (VDACS) licensed herbicide applicator in accordance with product labels. All herbicides will be applied using a foliar application method (broadcast spray or spot spray) applied from a boat or by walking using a backpack sprayer targeting foliage of target plants and limiting overspray. Treatment areas will be separated by a minimum of 66 feet (20 meters) (if possible) to reduce cross-contamination due to herbicide drift. Treatment will be conducted in the early summer prior to the two-horned water chestnut going to seed (pre-emergent). The ERDC demonstration project will only be conducted for one season. VADWR may continue treatment following the demonstration project in order to continue to collect field data up to the point that the two-horned water chestnut is completely eradicated from the lake.

Table 2-1: Lake Brittle Treatment Specification and Application Rates

Site	Acres	Vegetation	Herbicide(s)	Rate(s)
Lake Brittle Site A	3	Target plant; avoid lotus, native emergents, and native pondweeds	Florpyrauxifen-benzyl	59 g a.i. ha^{-1} [6.75 oz per surface acre = 5 PDU]
Lake Brittle Site B	9	Target plant mixed with lotus; avoid native pondweeds	Flumioxazin	429 g a.i. ha^{-1} [12 oz. per surface acre]
Lake Brittle Site C	3	Target plant; avoid lotus and native emergent	Imazamox	561 g a.i. ha^{-1} [64 oz. per surface acre]

Chemical control using herbicides is an efficient way to manage infestations of water chestnut and other invasive aquatic plants. There are different classes of herbicides that are useful for different species and site settings: contact and systemic herbicides. Application of the below listed individual herbicides, or a combination of these products, is the preferred control method for the management of the Lake Brittle two-horned water chestnut population.

2.2.1 Contact Herbicides

Contact herbicides quickly absorb into exposed plant surfaces and kill the aboveground plant material while limiting the emergence of new reproductive structures for a given period (NEANS, 2020). Currently, a potential contact herbicide for control of two-horned water chestnut in Lake Brittle includes flumioxazin, a protoporphyrinogen oxidase (PPO) inhibitor that blocks the production of heme and chlorophyll (WDNR, 2022b) (Table 2-2).

Flumioxazin is a USEPA registered broad-spectrum contact herbicide available in granular or liquid forms that inhibits chlorophyll production in plants. Upon application to actively growing plants, treated plants are rapidly affected and begin to decompose. In areas with dense vegetation, applications should be spaced approximately two weeks apart to minimize aquatic impacts, as plant decomposition can lead to low oxygen levels. It is recommended to apply the herbicide in the spring to young plants and during early morning or evening hours to reduce volatilization (WDNR, 2022a).

Flumioxazin can be surface or subsurface applied pre- or post-emergence. Herbicide as a broadcast spray (foliar) is applied directly to foliage and used to control floating or emergent aquatic plants (WDNR, 2022a).

Flumioxazin quickly degrades in the water column so plants that do not initially come in contact with the herbicide will not be affected (WDNR, 2022a). Commercial products that are utilized for water chestnut management in Virginia must be approved for aquatic use by the USEPA and VDACS. Subsurface applications are commonly used to

control invasive species such as submerged aquatic plants Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*). Native submerged species susceptible to subsurface flumioxazin application include coontail (*Ceratophyllum demersum*), fanwort (*Cabomba carliniana*), naiads (*Najas* spp.), variable watermilfoil *(Myriophyllum heterophyllum*), duckweeds (*Lemna spp.*), and pondweeds (*Potamogeton spp.*). American lotus (*Nelumbo lutea*) (a native waterlily present in Lake Brittle) has not been shown to be sensitive to flumioxazin (La´Zaro-Lobo et al. 2025). The herbicide is moderately toxic to freshwater fish and invertebrates but is non-toxic to birds and mammals with short-term exposure. Human health risks primarily affect herbicide applicators, as concentrated flumioxazin may cause skin and eye irritation. Flumioxazin was registered for aquatic use by the USEPA in 2010, with an interim registration released in 2021 (WDNR, 2022a).

2.2.2 Systemic Herbicides

Systemic herbicides are usually slow-acting and inhibit enzyme activity in target plants, which requires intermediate to long exposure periods with target plants. These herbicides are absorbed into the plant and moved or translocated within the plant tissue, causing death of the whole plant including belowground structures that can overwinter and resprout into new plants if CET requirements are met (NEANS, 2020). Potential systemic herbicides to be used at sites within Lake Brittle are florpyrauxifen-benzyl and imazamox. Florpyrauxifen-benzyl acts as a synthetic auxin that causes rapid and uncontrolled growth until plant death and imazamox is an acetolactate synthase (ALS) inhibitor that affects plant growth (WDNR 2022b, WDNR 2022c).

Florpyrauxifen-benzyl is a USEPA aquatic-use registered systemic herbicide that functions as a synthetic auxin, effectively mimicking a plant's natural growth hormone. This action induces excessive cellular elongation, ultimately leading to plant death (MDA & MDEP, 2019). Florpyrauxifen-benzyl can be surface or subsurface applied pre- or post-emergence. Commercial products that are utilized for water chestnut management must be approved for aquatic use. Initial degradation of the target plant begins within the first few days post-application, with complete decomposition typically occurring over a span of two to three weeks. Florpyrauxifen-benzyl is effective in managing invasive aquatic species including Eurasian watermilfoil (*Myriophyllum spicatum*), hybrid watermilfoil (*M. spicatum x M. sibiricum*), and yellow floating heart (*Nymphoides peltata*). Native species such as coontail (*Ceratophyllum demersum*) and American lotus (*Nelumbo lutea*) are also susceptible to this herbicide (WDNR, 2022c).

Florpyrauxifen-benzyl poses no threat to drinking water sources or recreational activities including fishing and swimming. The USEPA (2017) concluded that any florpyrauxifen-benzyl reaching surface or groundwater drinking water sources is anticipated to quickly degrade to its primary or secondary metabolites. These subsequent compounds are not expected to pose any adverse health effects to human consumption of food and water (USEPA, 2017). Furthermore, the herbicide presents no significant health risks to humans, whether through short-term or long-term exposure. More specifically, acute toxicity studies (<24 hours) indicated no adverse effects via inhalation, ingestion, or

dermal exposures of the herbicide (USEPA, 2017). Generally, florpyrauxifen-benzyl demonstrated little potential for bioaccumulation and is not likely to be carcinogenic to humans. It exhibits minimal toxicity to aquatic organisms, bees, birds, reptiles, amphibians, and mammals. Florpyrauxifen-benzyl was registered with the USEPA in 2017 (WDNR, 2022c).

Imazamox is an USEPA registered systemic herbicide effective on many submerged, emergent and floating broadleaf and monocot aquatic plants. Imazamox is available in granular or liquid formulations that inhibits acetolactate synthase, an enzyme essential for plant growth. Imazamox can be surface or subsurface applied pre- or post-emergence. Commercial products that are utilized for water chestnut management must be approved for aquatic use. Upon application, plant growth ceases, and decomposition typically occurs within several weeks. This herbicide is commonly used to control invasive emergent species such as purple loosestrife (*Lythrum salicaria*) and Japanese knotweed (*Fallopia japonica*), as well as submerged species like curly-leaf pondweed (*Potamogeton crispus*) and Eurasian watermilfoil (*Myriophyllum spicatum*). Native species susceptible to imazamox include water stargrass (*Heteranthera dubia*) and water lilies (*Nymphaea & Nuphar*) (WDNR, 2022a).

Imazamox is generally non-toxic to freshwater fish, invertebrates, birds, and mammals. Human health risks are primarily associated with applicator exposure, which may cause eye and skin irritation when concentrated. In aquatic environments, imazamox degrades rapidly, binds to sediments, and is not considered a threat to recreational water use. Imazamox was registered with the USEPA in 2008, and an interim registration review decision was released in 2019 (WDNR, 2022a). Exposure and risk characterization evaluating scenarios including consumption, dermal, and oral exposure of contaminated water, vegetation, and fish resulted in hazard quotients below the level of concern (SERA, 2010). Given that no human health concerns were identified (USEPA, 2001), in the USEPA Problem Formulation for registration review of imazamox (2015), no drinking water assessments were conducted for aquatic use of imazamox and there are no residues of concern in food or water. The USEPA (2015) found imazamox to have an average half-life of 6.8 hours in clear water at pH's of 5, 7, and 9.

All proposed chemicals described are found in several commercial herbicide products. All proposed commercial products have been identified to have limited impacts to the environment. Table 2-2 identifies commercial products that may be utilized. Product descriptions can be found in Appendix D.

Table 2-2: Proposed Chemical Descriptions and Associated Commercial Products

Site	Acres	Chemical Name	Type of Herbicide	Mechanism of Action	Potential Commercial Products	Potential Environmental Effects	Avoidance/Minimization Measures
Lake Brittle Site A	3	Flumioxazin	Contact	PPO Inhibitor	Clipper, Flumigard WDG, Flumigard SC, Semera SC, Properller	Moderately toxic to fish and invertebrates.	Target water chestnut, avoid lotus, native emergents, and native pondweeds
Lake Brittle Site B	9	Florpyrauxifen-benzyl	Systemic	Synthetic Auxin	ProCellaCOR SC	Native aquatic plants are susceptible.	Target plant mixed with lotus; avoid native pondweeds
Lake Brittle Site C	3	Imazamox	Systemic	ALS inhibitor	Clearcast, Imox, Imazacast, Top Deck, Castaway	Native aquatic plants are susceptible.	Target plant; avoid lotus and native emergent

2.3 Monitoring

Monitoring will be done in conjunction with the herbicide treatment of two-horned water chestnut to assess water quality, efficacy of treatment, and (if any) non-target impacts to native aquatic vegetation. Five permanent monitoring plots (1-square-meter [m^2] quadrats) were established in early July 2024 in the proposed treatment areas and will be monitored twice within the 2025 growing season (July and September) by USACE ERDC (Tables 2-3, 2-4 & Figure 2-3). Metrics that will be recorded for each plot include water depth (centimeters [cm]), water temperature (°Celsius [C]), dissolved oxygen (percent), conductivity (siemens [*u*S]/cm), potential of hydrogen (pH), aquatic plant community composition and cover (percent), and two-horned water chestnut rosette density (count of individual rosettes at the water's surface). A subset of rosettes (n=9) will be sampled from each quadrat with individual rosette diameter (measured in cm across the widest point) with number of flowers and fruits recorded. Measurements of species richness and physical observations of necrosis or leaf chlorosis pre- and post-treatment allows estimation of any non-target impacts to native macrophytes. Further, as outlined in Section 11, steps will be taken to avoid and/or minimize impacts.

Residual herbicide testing will be conducted to verify application rates and timely degradation of the active ingredients. Water samples will be collected at each treatment site and sent to an analytical laboratory to determine aqueous herbicide concentrations pre- and post-treatment as specified by VA Herbicide Permit until herbicides are nondetectable in water samples. Each sample will consist of 30 ml water collected at 30 cm deep. A subset of predetermined sampling points will be randomly assigned within the treatment areas (n = 1 sampling point each treatment area), and one sampling point outside of each treatment area (n = 3). Following collection, water samples will be appropriately preserved (acid fixed if necessary), stored on ice, frozen, and shipped overnight to the laboratory for analysis.

Table 2-3: Lake Brittle, Virginia field demonstration monitoring plot locations

Plot #	Plot name	Latitude	Longitude	Mean water depth (cm)
1	LBR-VA 1	38.7499	-77.6939	33.5
2	LBR-VA 2	38.7503	-77.6939	27.0
3	LBR-VA 3	38.7511	-77.6908	24.0
4	LBR-VA 4	38.7539	-77.6941	26.0
5	LBR-VA 5	38.7525	-77.6975	27.5

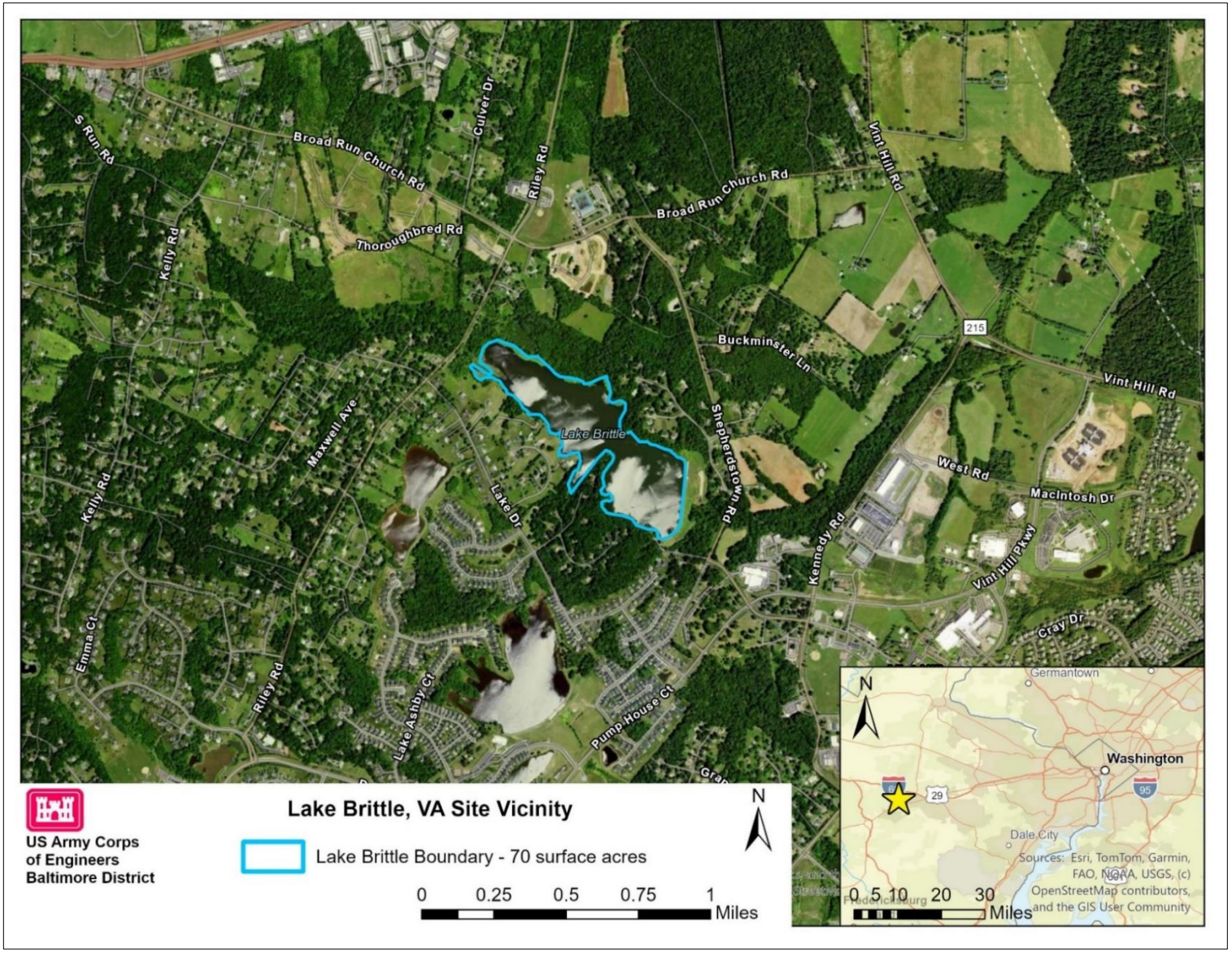

Figure 2-1: Lake Brittle Location Map

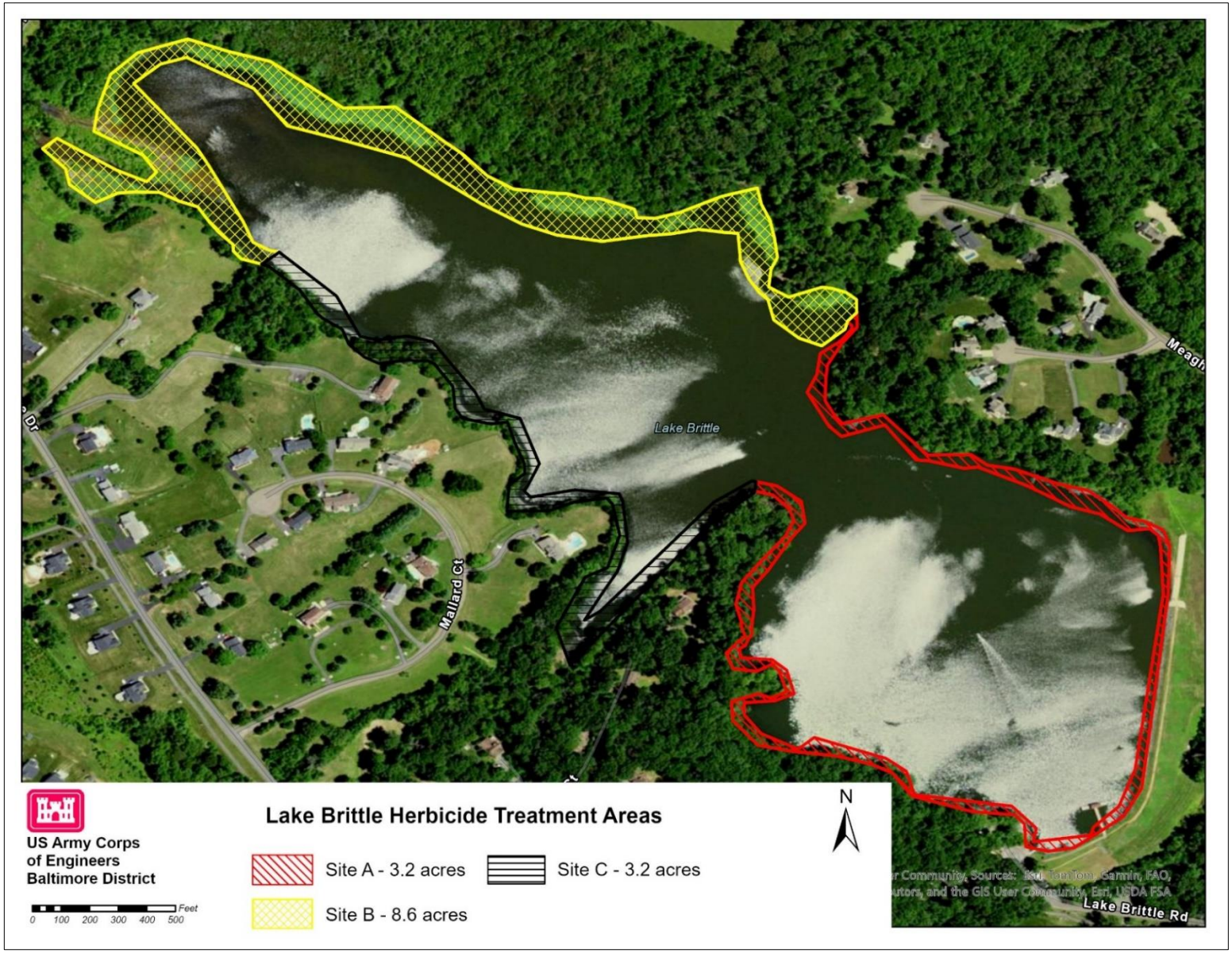

Figure 2-2: Lake Brittle Treatment Locations

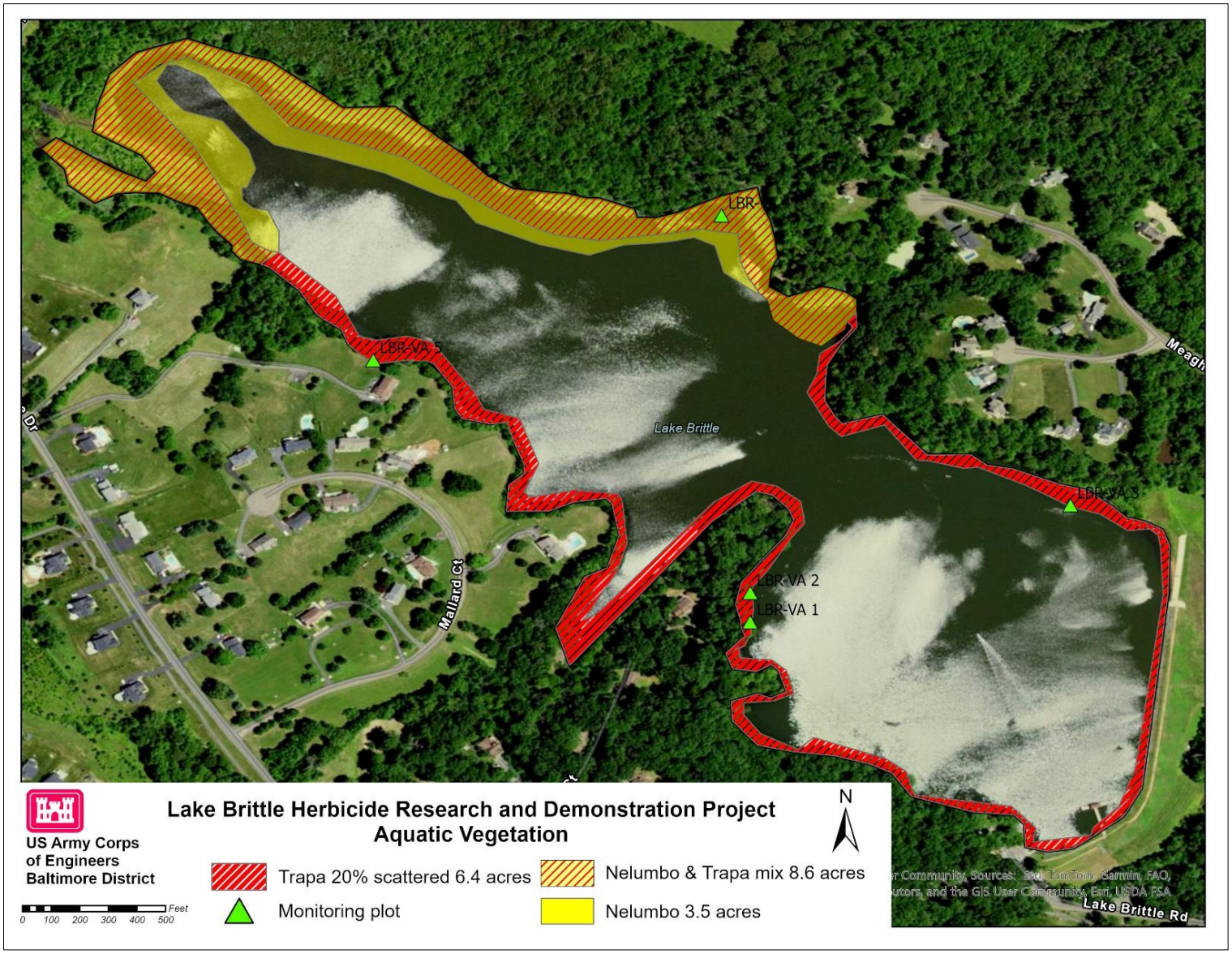

Figure 2-3: Water Chestnut locations and pre-established monitoring plots within Lake Brittle

2.4 Target Invasive Plant

Invasive aquatic plants are plant species that are considered non-native to an aquatic ecosystem and once established causes economic, human health, and/or environmental harm. The two-horned water chestnut was first identified in the U.S. in the tidal Potomac River in Pohick Bay, Lorton, Virginia in 2014. Originally misidentified as Eurasian water chestnut (*Trapa natans*), morphological and DNA analysis confirmed these Mid-Atlantic populations to be genetically distinct from its congener. Native to Taiwan, Japan, China, and Korea, two-horned water chestnut represents a new species introduction of water chestnut into the U.S. (Chorak et. al, 2019). Two-horned water chestnut now occurs in many counties within the freshwater tributaries of the Chesapeake Bay (Virginia and Maryland) and the Roanoke River Basin (Virginia) where it demonstrates rapid growth competing for available resources and forming dense surface mats of floating rosettes that shade and outcompete native submerged aquatic vegetation. Water chestnut is able to tolerate varied water conditions but prefers eutrophic (rich in nutrients that causes depletion of dissolved oxygen) waters and is able to germinate across a wide range of pH between 4.2 to 8.3 (Hummel & Kiviat, 2004). As an annual species, two-horned water chestnut flowers in June and within 30 days negatively buoyant mature fruits form on floating rosettes that fall to the substrate (Poudel et. al, 2023). Unlike European water chestnut, seeds do not require dormancy but can over-winter and germinate the following growing season.

Both *Trapa* spp. possess similar invasive traits that degrade aquatic habitats by altering biodiversity and ecosystem function. Increased growth and competitive ability shift species richness and dominance, thereby altering native submerged aquatic vegetation (SAV) community composition and associated biota. Seasonal senescence of water chestnut drives hypoxia through rapid decomposition of large stands of vegetation, and erosion occurs due to loss of belowground biomass (roots) anchoring sediments. Large spiny fruits and seeds capable of puncturing skin are easily mobile by clinging to animal fur or feathers, clothing, and boating and fishing gear (ropes, nets, boat trailers). Waterfowl (specifically geese) are likely the primary vectors for spread of two-horned water chestnut. Several days (depending on temperature) are required for seeds to desiccate and die thereby increasing the chances of viable seeds traversing watersheds. Left unmanaged, in addition to continued degradation of fisheries habitat, affected water bodies serve as a seed source for continued range expansion facilitating invasion of two-horned water chestnut to other water bodies.

3 Purpose and Need

The purpose of the proposed project is to provide a field-scale demonstration of technology implemented under the APCRP, which is evaluating the effectiveness of an aquatic herbicide to manage two-horned water chestnut in Lake Brittle, Virginia. This field demonstration will provide valuable information for developing future guidance on how to manage this invasive aquatic plant, which is rapidly expanding throughout the Mid-Atlantic and Northeastern U.S. and threatens critical freshwater systems. In addition, this field demonstration will evaluate herbicide efficacy where two-horned

water chestnut is most problematic, optimal timing of treatment, non-target native aquatic plant impacts, and herbicide CET requirements for effective control of two-horned water chestnut. The proposed project will also provide control of water chestnut within treatment areas in the lake for the duration of the research and demonstration project to demonstrate and understand effective management practices.

The need for the proposed project is to address impairments to the natural and human environment by invasive two-horned water chestnut. The target invasive plant was first recorded in Lake Brittle in 2019 (USGS NAS, 2025). The species has quickly spread throughout the region since its introduction, having been identified in over 70 water bodies and six counties in Virginia (Sweany & Heffernan, 2022). It infests tidally influenced and slow-moving freshwater systems, having a variety of impacts to the human and natural environment. Water chestnut can alter native habitats by limiting the species diversity, which can in turn limit shelter and foraging resources, and severely impact fisheries in aquatic systems. It also inhibits recreation by clogging water bodies used for boating, fishing, and swimming. Effects to local economies can be severe and include causing obstacles to the transport of goods and services, lowering property values, limiting agricultural productivity, and impacting public utility operations, on top of the costs of invasive species control measures. Further, given that two-horned water chestnut is newly introduced to the U.S. and is currently experiencing rapid range expansion within the Mid-Atlantic region, it is important to better understand whether currently established management practices for long-established Eurasian water chestnut are effective for this species.

4 Alternatives

This section presents various alternatives evaluated and briefly discusses the reason for the elimination of some alternatives.

4.1 No Action Alternative

Under the No-Action Alternative, USACE would not be conducting this field demonstration to develop future guidance on how to manage this invasive aquatic plant. This future guidance includes determining herbicide efficacy where two-horned water chestnut is most problematic, optimal timing of treatment, understanding non-target impacts to native aquatic plants, and herbicide CET requirements for effective control of two-horned water chestnut. Without this project, USACE would not obtain this information for future studies and would be unable to communicate to other agencies and organizations the best methods to use for two-horned water chestnut control.

Under the no action alternative, there would be continued adverse impacts to Lake Brittle and nearby water bodies susceptible to colonization. Control of the invasive aquatic plant, two-horned water chestnut, would not occur, maintaining the potential to rapidly increase in abundance within Lake Brittle, in surrounding aquatic systems, and across the Mid-Atlantic region and beyond, as invasion barriers are crossed, and suitable habitat is invaded. Adverse impacts to boat traffic, recreational opportunities,

and the integrity of aquatic communities in the system would continue to occur.

The environmental consequences (effects) of the No-Action Alternative are analyzed in Section 8 below in order to compare the effects of the preferred alternative to the no-action.

4.2 Mechanical Removal

4.2.1 Harvesters

There are several commonly used methods of physically controlling invasive plant species. Mechanical removal of water chestnut using harvesters and under-water cutters has been investigated as a potential management strategy. This method has typically been used to temporarily clear high-traffic waterways impaired by large infestations. Harvesting requires disposal of material at an upland site or desiccation in floating cribs, which may lead to localized depletions of dissolved oxygen (Countryman, 1978). Cost of equipment operation and maintenance is an additional limiting factor of this method (O'Neill, 2006). Timing of harvesting is crucial, in which control should be employed prior to fruit maturation. Careful consideration must be taken to remove the entire plant to avoid recovery and spread from fragmented plants. Further, this method is non-selective, removing native SAV and/or disturbing habitat supporting desirable macrophyte colonies. Due to cost, the limited size of Lake Brittle, and damage to existing native aquatic vegetation as well as the associated disturbance to the system, this method is not considered a feasible alternative. In addition, the alternative does not meet the purpose and need of the project to conduct a demonstration project to evaluate the effectiveness of herbicides. Therefore, this alternative would not be an effective treatment to evaluate the effectiveness of herbicides and has not been assessed further.

4.2.2 Manual Removal

Manual removal (hand-pulling) is often used in conjunction with chemical control efforts and typically is most effective for immediate control of small populations (i.e., less than 0.5 acre). Similar to mechanical control, hand-pulling requires complete removal (Dodd, unpublished data) and disposal prior to fruit development (Hummel & Kiviat, 2004). This method can be significantly labor intensive (Sweany & Heffernan, 2022). A multi-agency collaborative effort in Maryland in 2023 in which 195 man-hours ($10-15k estimated labor cost) were exerted, resulted in approximately 0.062 acres of two-horned water chestnut removal (Dodd et al., unpublished data). Given the densities at which two-horned water chestnut is found in Lake Brittle, the difficulty of finding plants and navigating stands intermixed with native American lotus, and the fact that incomplete removal of two-horned water chestnut results in increased clonal recovery, hand-pulling is not suitable for the control of water chestnut in this system. In addition, the alternative does not meet the purpose and need of the project to conduct a demonstration project to evaluate the effectiveness of herbicides. Therefore, this alternative was not assessed further.

4.3 Water Level Drawdown

Water level drawdown is another physical method that is used to control aquatic invasive plant species. Drawdown is used to expose plants to air and dry them out, causing desiccation and freezing. This method requires impoundment of water by a dam or other water control structure that enables water levels to be drawn up and down so that plants are exposed to the air. The change in water levels can interfere with fish and wildlife habitat utilization and reproduction depending on the time of year and system conditions. Additionally, drawdowns may be detrimental to native SAV providing habitat to aquatic invertebrates that support fish populations (Robinson, 2002). Given the environmental, economic, and recreational impacts, drawdown is not a feasible control strategy for Lake Brittle. In addition, the alternative does not meet the purpose and need of the project to conduct a demonstration project to evaluate the effectiveness of herbicides. Therefore, this alternative is not assessed further.

4.4 Benthic Barriers

Another physical method of control is the use of benthic barriers which are mats made of plastic, fiberglass, or nylon that are placed over vegetation and anchored to block sunlight from reaching the water system bottom. They work by shading out existing plants as well as preventing germination of new plants (Cornell Cooperative Extension, 2016). As evidenced in the management of *Hydrilla verticillata* in the Croton River, New York, benthic barriers are effective for reducing biomass of smaller infestations (less than 0.25 acres) but even then, have not demonstrated complete eradication (NYDEC, 2018). They are most effective in small areas or for early detection and rapid response to new populations. The total estimated two-horned water chestnut infestation of 15 acres at Lake Brittle well exceeds the threshold of benthic barrier efficacy. The barriers are a non-selective control strategy that also block light for native species on the water bottom. At Lake Brittle, there is approximately 15.0 acres of two-horned water chestnut intermixed with desirable native plant species (Figure 2-3). Additionally, benthic barriers have been shown to alter the physical and chemical properties of the existing sediment and macroinvertebrate composition (Ussery et al., 1997). There can be difficulties in installation and maintenance, and high cost depending on the area of control (NEANS, 2020). Feasibility of deploying benthic barriers is relatively contingent on water depth and site homogeneity, which are not consistent at Lake Brittle (Figure 5-1). The highest density of the target plant infestation at Lake Brittle is in shallow (2 ft) shoreline area. However, with increasing water depths, specialized personnel (i.e., scuba divers) may be required for benthic barrier installation (CebadaMora & Terbush, n.d.). Further, treatment plots with slopes, obstructions, or extensive plant growth may additionally limit barrier installation. These are important considerations given two-horned water chestnut can establish in up to 3.6 m depths and that if any target plants establish outside the benthic barrier footprint, they would not be eradicated (Countryman, 1978). For these reasons, this method was not considered feasible for control of two-horned water chestnut in Lake Brittle. In addition, the alternative does not meet the purpose and need of the project to conduct a demonstration project to evaluate the effectiveness of

herbicides. Therefore, this alternative is not assessed further.

4.5 Biological Control

The primary biological control (biocontrol) agent evaluated for *Trapa* spp. is the water-lily leaf beetle, *Galerucella birmanica* (Jacoby). Although risk was minimal, host specificity tests revealed potential for non-target herbivory on native watershield, *Brasenia schreberi* (Simmons & Blossey, 2023).

Grass carp (*Ctenopharyngodon idella*) are generalist herbivores that have been used to control water chestnut (Krupauer, 1971). However, there is no evidence of sufficient efficacy for using this method (Mikulyuk & Nault, 2009). Further, their diet is not selective for water chestnut and introductions may result in the loss of substantial amounts of native SAV. Management using grass carp requires careful monitoring of feeding patterns and limitation of escape into other water bodies (Hummel & Kiviat, 2004). While grass carp have been present in Lake Brittle since 2021 to control invasive submerged aquatic plant *Hydrilla verticillata*, they appear to have limited impact on two-horned water chestnut at current rates stocked.

At this time, no biological control agents for the two-horned water chestnut have been approved for release in the U.S. As such, biological control is not currently an effective means of controlling water chestnut in Lake Brittle and this alternative is not considered feasible. In addition, the alternative does not meet the purpose and need of the project to conduct a demonstration project to evaluate the effectiveness of herbicides. Therefore, this alternative is not assessed further.

4.6 Chemical Control – Preferred Alternative

The preferred alternative involves treatment of the aquatic invasive plant two-horned water chestnut using three different EPA-approved herbicides as part of a field-scale study to evaluate the effectiveness of an aquatic herbicide to manage this species. This action will provide valuable information for developing future guidance on how to manage water chestnut including the efficacy of certain herbicides, the optimal timing of treatment, the impacts on non-target species, and herbicide CET requirements for effective control of water chestnut. The proposed herbicides were selected for the demonstration project because they are registered for aquatic use in Virginia and previously evidenced to be effective for this species (Dodd et al., 2022; Poudel, 2021). Further, the proposed herbicides demonstrate minimal adverse impacts as outlined below in Section 9. The data and observations collected from the herbicide treatments and subsequent monitoring will be used to develop future treatment plans as part of the research, and determine effective herbicides, timing, and CET requirement for this water chestnut genotype in this environment. The conclusions from this investigation will be used to develop treatment procedures to transfer to regional, state, and local agencies, and non-governmental organizations to use for effective control of two-horned water chestnut.

The proposed project will involve the direct application of herbicide to Lake Brittle to control populations of two-horned water chestnut that inhibit use of the lake for recreation and degrade aquatic habitat. Identified locations within the Lake Brittle will have a site-specific treatment plan based on the site conditions, including but not limited to water flow dynamics, water depths, and plant densities.

The environmental consequences (effects) of the preferred alternative are analyzed in Section 8 below.

5 Affected Environment

Lake Brittle is a 77-acre impoundment owned by VADWR, constructed in 1953. It is situated east of Warrenton and southeast of New Baltimore, Virginia, approximately 37 miles southwest of Washington, D.C. The lake's average depth is approximately 7 feet, with a maximum depth of 25 feet near the spillway. South Run serves as the primary inflow to the lake from the western end and the outflow is located on the eastern end, where it discharges into South Run (Figure 5-1).

The surrounding land use is predominantly rural, characterized by forested areas and some residential development. Lake Brittle primarily functions as a warmwater fishery, supporting species such as largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirusI*), redear sunfish (*Lepomis microlophus*), black crappie (*Pomoxis nigromaculatus*), and channel catfish (*Ictalurus punctatus*). The lake is stocked annually with walleye (*Sander vitreus*). Northern snakehead (*Channa argus*), an invasive species, was illegally introduced around 2015. In addition to fishing, the lake provides recreational opportunities, including boating and picnicking. Boating is restricted to electric trolling motors only.

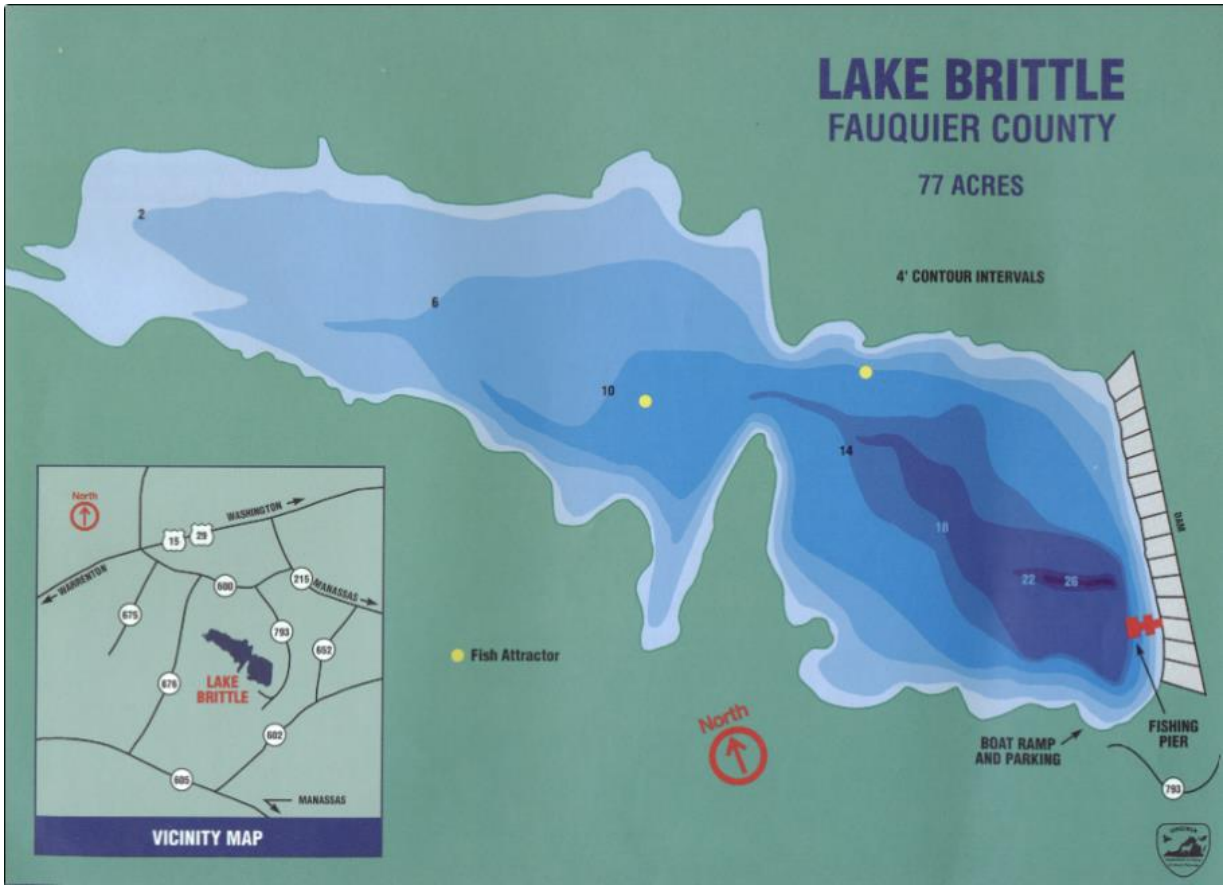

Figure 5-1: Map of Lake Brittle. (Map generated by VADWR)

6 Existing Biological Environment

6.1 Wetlands

A single wetland has been identified adjacent to Lake Brittle, located at the western end of the lake near the inflow of South Run. This approximately 0.60-acre wetland is classified as a palustrine system, which is characterized as a nontidal wetland dominated by trees and shrubs. Surface water is present for extended periods during the early growing season but typically recedes during the warmer months. The wetland was formed as a result of the impoundment created by the dam. Herbaceous and woody plant wetland species that can be typically identified in wetlands of a palustrine system in Virginia include skunk cabbage (*Symplocarpus foetidus)*, spicebush (*Lindera benzoin*), black willow (*Salix nigra*) and silky dogwood (*Comus amomum*) (USGS 2025b). A comprehensive list of hydrophytic vegetation known to occur in the Northern Piedmont Ecoregion of Virginia collated by the Piedmont Environmental Council (2008) is provided in Appendix A.

6.2 Floodplains

The Federal Emergency Management Agency (FEMA) defines Zone A as areas that will become inundated by a flood event having a 1 percent chance of being equaled or exceeded in any given year and a 26 percent chance of flooding over the life of a 30-year mortgage. The 1 percent annual chance flood is also referred to as the base flood or the 100-year flood (FEMA, 2020). As illustrated by the aerial view in Figure 2-2, there exists a forested buffer of varying width on most sides of the lake. Large, forested tracts are located on the north and southeast sides of the lake, with maintained lawn and suburban homes to the southwest and east sides of the lake. Figure 6-1 below shows the lake and surrounding floodplain within Zone A.

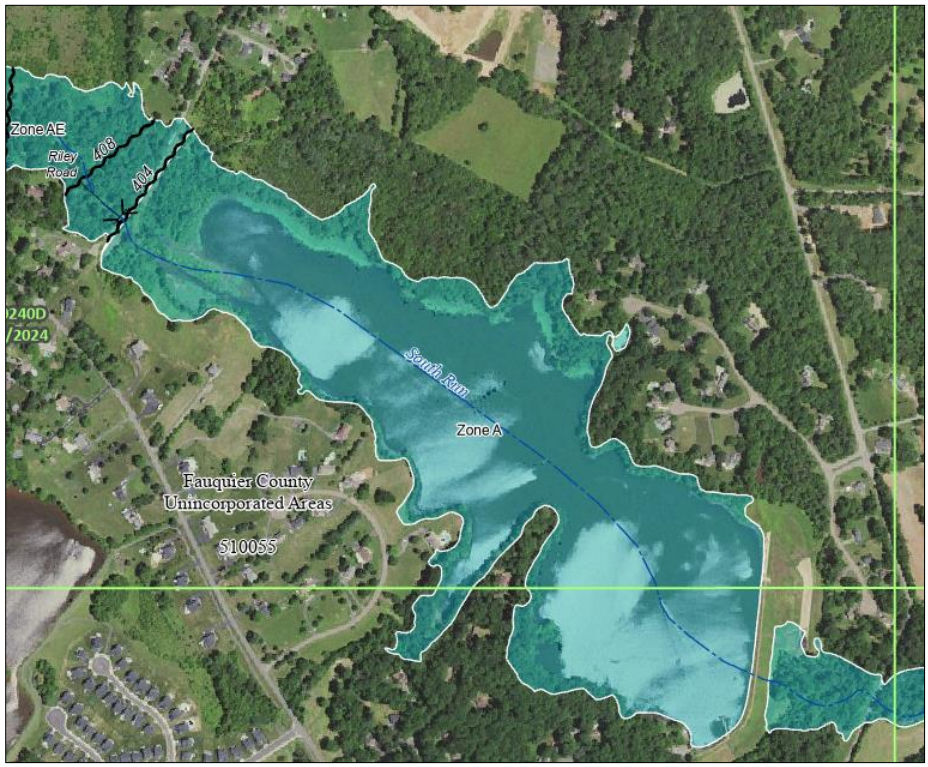

Figure 6-1: Areas of Lake Brittle within FEMA Flood Zone A (FEMA)

Lake Brittle is an impoundment (dam) created by the construction of an earthfill structure 1200 feet long and 32.5 feet high. The normal pool elevation within the lake is maintained by a drop inlet serving the principal spillway. When the pool rises above the crest of the drop inlet, water passes through the spillway. During extreme flood events, the pool may rise above the ungated spillway crest and the emergency spillway crest causing the water to flow downstream. Even during peak rainfall events, such as Hurricane Agnes in 1972, water was still 2 feet below the top of the dam. Therefore, the area surrounding Lake Brittle is not flooded similarly to a natural lake system.

6.3 Aquatic Vegetation

Aquatic vegetation in Lake Brittle consists primarily of submerged, emergent, and floating plant species, which contribute to the lake's overall productivity and ecological health. The plant community is influenced by factors such as water depth, nutrient levels, and seasonal fluctuations in water levels. Common native species found in the lake include various types of submerged plants such as the Canadian waterweed (*Elodea canadensis),* leafy pondweed (*Potamogeton foliosus),* and water lily American lotus *(Nelumbo lutea),* as well as emergent vegetation like cattails (*Typha* spp.), American water willow (*Justicia americana*), smartweeds (*Persicaria* spp.), arrow arum (*Peltandra virginica*), bur-reed (*Sparganium americanum*), and bulrushes (*Schoenoplectus* spp.). Floating species such as duckweed (*Lemna spp.*) may also be present, particularly during periods of high nutrient availability (VADWR, 2025a). Figure 6-1 provides the extent of water chestnut and American lotus (*Nelumbo lutea)* within Lake Brittle.

These aquatic plants play a critical role in providing habitat for aquatic organisms, stabilizing sediments, and helping to regulate nutrient cycling within the lake. Table 6-1 contains aquatic and wetland plant and cyanobacterium species observed in Lake Brittle derived from an on-line database (iNaturalist, 2025) and field surveys conducted in summer 2024 (Dodd, unpublished data). Table 6-2 illustrates the population density of the survey plots in summer 2024.

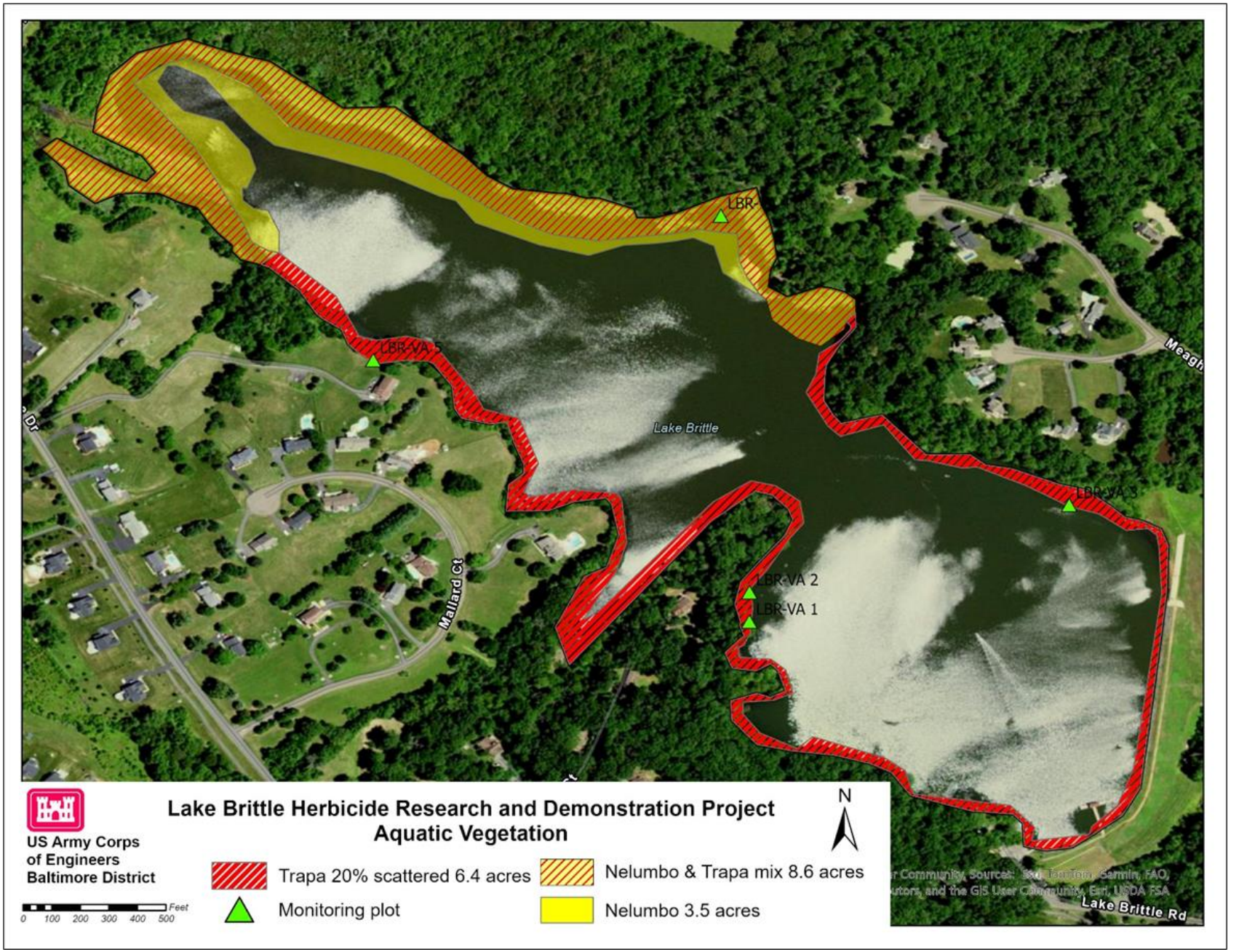

Figure 6-2: Lake Brittle *Nelumbo* locations

Table 6-1: Macrophytes and cyanobacterium recorded in Lake Brittle (iNaturalist, 2025); * = observed during June/September 2024 (Dodd personal observation), Lake Brittle, VA; OBL = obligate; FACW = facultative wetland.

Scientific name	Common name	Habit	Wetland Status	Native status
Asclepias incarnata	Swamp milkweed	Emergent	OBL	Native
Carex frankii	Frank's Sedge	Emergent	OBL	Native
Cephalanthus occidentalis	Common buttonbush	Shrub	OBL	Native
*Elodea canadensis**	Canadian waterweed	Submerged	OBL	Native
*Hydrilla verticillata peregrine**	Wandering hydrilla	Submerged	OBL	Exotic
Iris pseudacorus	Yellow iris	Emergent	OBL	Exotic
Justicia americana	American water-willow	Emergent	OBL	Native
Lepidium virginicum	Virginia pepperweed	Emergent	OBL	Native
Ludwigia peploides	Floating Primrose-Willow	Emergent	OBL	Native
*Microseira wollei**	Lyngbya	Submerged	OBL	Exotic
*Myriophyllum aquaticum**	Parrot's feather	Submerged	OBL	Exotic
*Najas minor**	Brittle naiad	Submerged	OBL	Exotic
*Nelumbo lutea**	American lotus	Floating-leaved	OBL	Native
Onoclea sensibilis	Sensitive Fern	Emergent	FACW	Native
*Peltandra virginica**	Green arrow arum	Emergent	OBL	Native
Persicaria spp.	Smartweeds	Emergent	OBL	Native
Platanus occidentalis	American sycamore	Tree	FACW	Native
*Potamogeton foliosus**	Leafy pondweed	Submerged	OBL	Native
Rosa palustris	Swamp rose	Shrub	OBL	Native
Sambucus canadensis	American Black Elderberry	Shrub	OBL	Native
Schoenoplectus spp.*	Bulrushes	Emergent	OBL	Native
Sparganium americanum	American bur-reed	Emergent	OBL	Native
*Spirodela polyrhiza**	Greater duckweed	Floating	OBL	Native
Trapa bispinosa var. *iinumai**	Two-horned water chestnut	Floating-leaved	OBL	Exotic
*Wolffia sp.**	Watermeal	Floating	OBL	Native

Table 6-2. *Trapa* and SAV % cover and *Trapa* rosette density based on 1m² quadrat sampled in Lake Brittle 7/1/2024 and 9/4/2024; mean ± SE (standard error) for flowers/buds, mature and immature fruits, and rosette diameter based on *Trapa* specimens collected per plot (n = 9).

Survey date	Plot #	*Trapa* cover (%)	SAV cover (%)	Rosette density (count [ct])	Mean flowers & buds (ct)	SE	Mean mature fruits (ct)	SE	Mean immature fruits (ct)	SE	Mean rosette diameter (cm)	SE
7/1/2024	1	80	10	40	0.6	0	0	0	0	0	17.1	1
	2	50	40	30	0	0	0	0	0	0	18	2
	3	80	10	40	1.1	0	0	0	0	0	20.2	1
	4	85	15	32	1.7	0	0	0	2.1	1	27	2
	5	50	21	30	0.2	0	0	0	0	0	17.2	1
	Site Mean	69	19	34	0.7	0	0	0	0.4	0	19.9	1
Survey date	**Plot #**	***Trapa* cover (%)**	**SAV cover (%)**	**Rosette density (ct)**	**Mean flowers & buds (ct)**	**SE**	**Mean mature fruits (ct)**	**SE**	**Mean immature fruits (ct)**	**SE**	**Mean rosette diameter (cm)**	**SE**
9/4/2024	1	80	10	40	0	0	3.6	1	0	0	24.3	2
	2	100	0	37	0	0	3.7	1	0	0	21.9	1
	3	100	0	35	0.1	0	3.7	1	0	0	21.8	1
	4	75	25	21	0.2	0	3.9	1	0	0	23.7	2
	5	90	6	36	0.1	0	2.4	1	0	0	16.6	1
	Site Mean	89	8.2	33.8	0.1	0	3.4	0	0	0	21.6	1

6.4 Benthic and Shellfish Resources

Microorganisms are integral to nutrient cycling, sediment stabilization, and the overall health of aquatic ecosystems. Common benthic organisms in freshwater lakes typically include macroinvertebrates, crustaceans, and algae. Macroinvertebrates such as stonefly nymphs (*Plecoptera*) and dragonfly nymphs (*Odonata*) are prevalent in these systems and serve as primary food sources for fish and birds. Crustaceans, including amphipods (*Gammaridae*) and freshwater snails (*Gastropoda*), contribute to organic matter decomposition and act as a food source for higher trophic levels. The distribution and abundance of benthic species are influenced by factors such as sediment composition, nutrient concentrations, dissolved oxygen levels, and overall water quality. Detailed data on the benthic species composition and abundance within Lake Brittle has not been documented.

6.5 Fish and Wildlife

Lake Brittle is home to rich communities of fish populations that use its waters for foraging, migration, and spawning. Resident fish species include bluegill (*Lepomis macrochirus),* redear sunfish (*Lepomis microlophus)*, largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), walleye (*Sander vitreus),* black crappie (*Pomoxis nigromaculatus),* flathead catfish (*Pylodictis olivaris)*, yellow perch (*Perca flacescens)* and northern snakehead (*Channa argus)* (Willlis, 2020).

There are several freshwater turtle species that may be found within Lake Brittle including the eastern painted turtle (*Chrysemys picta picta*), snapping turtles (*Chelydra s. serpentine*), wood turtle (*Glyptemys insculpta*), common box turtle (*Terrapene carolina)*, northern redbellied cooter (*Pseudemys rubriventris*), and river cooter (*Pseudemys concinna*). The omnivorous diets of freshwater turtles include aquatic vegetation, mussels, snails, crayfish, insects, fish, tadpoles, and carrion.

Several snake species may inhabit the waters or adjacent wetlands of the proposed treatment sites including the eastern copperhead (*Agkisrodon contorix)*, eastern wormsnake (*Carphophis amoenus)*, northern black racer (*Coluber constrictor)*, northern ring-necked snake (*Diadophis punctatus edwardsii)*, timber rattlesnack (*Crotalus horridus)*, eastern hog-nose snake (*Heterodon platirhinos)*, northern mole kingsnake (*Lampropeltis rhombomaculata),* eastern milksnake (*Lampropeltis triangulum),* northern watersnake (*Nerodia sipedon),* northern rough greensnake (*Opheodrys aestivus)*, eastern ratsnake (*Pantherophis alleghaniensis)*, red cornsnake (*Pantherophis guttatus),* queensnake (*regina septemvittata)*, Dekay's brownsnake (*Storeria dekayi)*, red-bellied snake (*Storeia occipitomaculata)*, common ribbonsnake (*Thamnophis saurita)*, eastern garter (*Thamnophis sirtalis),* and eastern smooth earthsnake (*Virginia valeriae)*. These snakes either exclusively or partially inhabit aquatic and/or wetland areas, and at least part of their diets include aquatic organisms (e.g., frogs, fish, snails, salamanders, etc.) (VHS 2025).

A variety of amphibians may be present at the sites within Lake Brittle. There are four species of frog that may inhabit the waters of the project areas or the adjacent habitats: American bullfrog (*Rana catesbeiana*), coastal plains leopard frog (*Lithobates sphenocephalus utriculariu*), Cope's gray treefrog (*Hyla chrysoscelis*), eastern cricket frog (*Acris crepitans)*, gray treefrog (*Hyla versicolor)*, green frog (*Lithobates clamitans)*, green treefrog (*Hyla cinerea)*, northern cricket frog (*Acris crepitans)*, pickerel frog (*Rana palustris*), upland chorus frog (*Pseudacris feriarum)*, and wood frog (*Lithobates sylvaticus)*. All species inhabit waterbodies or bordering wetlands for at least a portion of their life cycles. Prey species include insects and other invertebrates, as well as other frogs (VADWR, 2025c).

While primarily terrestrial mammal species, the eastern gray squirrel (*Sciurus carolinensis*) and white-tailed deer (*Odocoileus virginianus*) may be present in the project area. Additional common mammals that may be present in the areas include river otters (*Lutra canadensis*) and beavers (*Castor canadensis*). These species are semi-aquatic, spending a majority of time in the rivers and ponds where their dens are located. Beavers are primarily herbivores, feeding on woody trees and shrub species, and aquatic plants. River otters prefer fish, frogs, shellfish, insects, small birds and mammals (VADWR, 2025d).

Lake Brittle is part of the Atlantic flyway for neotropical migratory birds and provides nesting and resting habitat for important bird species including waterfowl, raptors, and federally threatened and endangered species. Bald eagles (*Haliaeetus leucocephalus*) and ospreys (*Pandion haliaetus*) and their nests are commonly seen in large trees and snags along the edges of water bodies. There are two historical bald eagle nests located at Lake Manassas which is approximately two miles northeast of Lake Brittle (CCB, 2025). The closest identified osprey nest is located approximately 13 miles away from Lake Brittle. Both bald eagles and osprey may utilize Lake Brittle for forage, feeding on sunfish species such as bluegill (*Lepomis macrochirus)* and redear sunfish (*Lepomis microlophus)*. Waterfowl can utilize Lake Brittle area for breeding, overwintering, and migration. Mallards (*Anas platyhynchos)* are common dabbling foragers, which can be found in various types of waterbodies including lakes and marshes. Their diets vary with location and season, consisting primarily of plant material and occasionally small mollusks, crustaceans, and aquatic arthropods and minnows (Mass, 2025).

Migratory birds identified by the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation System (IPaC) that may be present within the entire project area are listed in Table 6-3. Birds that are of Conservation Concern (BCC) by the USFWS are denoted with an "*". Bird species considered for the BCC include nongame birds, game birds without hunting season, subsistence-hunted nongame birds in Alaska, and Endangered Species Act (ESA) candidate, proposed, and recently delisted species. The overall goal of the BCC designation is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the USFWS's highest conservation priorities (USFWS, 2023a).

Table 6-3: Migratory birds that may utilize the project area (USFWS, 2023a).

Common Name	Scientific Name	Common Name	Scientific Name
Bald eagle	*Haliaeetus leucocephalus*	Prairie warbler*	*Dendroica discolor*
Black-billed cuckoo*	*Coccyzus erythropthalmus*	Prothonotary warbler	*Protonotaria citrea*
Chimney swift*	*Chaetura pelagica*	Red-headed woodpecker*	*Melanerpes erythrocephalus*
Golden eagle	*Aquila chrysaetos*	Rusty blackbird*	*Euphagus carolinus*
Grasshopper sparrow	*Ammodramus savannarum perpallidus*	Wood thrush*	*Hylocichla mustelina*

6.6 Threatened and Endangered Species

The project areas provide potential habitat for federally listed species under the Endangered Species Act (ESA) as well as protected state-listed threatened and endangered species. Species that have been identified as potentially occurring in the project location are addressed in section 9.6.

6.6.1 Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) has been identified as a proposed threatened species within the project area. Additionally, it has been determined that Lake Brittle may contain potential critical habitat for the species (Appendix C).

Monarch butterflies are expected to be in the study area from May through September. Female monarchs deposit eggs on milkweed leaves (*Asclepias sp.*), which the larvae exclusively feed on. Milkweed could occur in the project area, which is frequently found in sunny roadsides, fence lines, fields, prairies, and pastures (Bird Watching HQ, 2024). Adult monarch butterflies visit and pollinate at least 33 species of flowers each year, including many asters and goldenrods, which may be found in the project area.

6.6.2 State-Listed Species

VADWR has a program that protects Virginia's native biological diversity and emphasizes the state's most vulnerable species and ecosystems. The Virginia Fish and Wildlife Information Service search report protects state listed species by identifying species of concern, within a project area. Table 6-4 shows the species identified as potentially occurring within project areas based on historical records and the available habitat, as well as critical habitat present.

Table 6-4: State-listed species occurring within a 3-mile radius of Lake Brittle.

Common Name	Scientific Name	Status*
Northern Long-eared Bat	*Myotis septentrionalis*	ST
Dwarf Wedgemussel	*Alasmidonta heterodon*	SE
Rusty Patched Bumble Bee	*Bombus affinis*	SE
Atlantic Sturgeon	*Acipenser oxyrinchus*	SE
Yellow Lance	*Elliptio lanceolata*	ST
Little Brown Bat	*Myotis lucifugus*	SE
Tri-colored Bat	*Perimyotis subflavus*	SE
Brook Floater	*Alasmidonta varicosa*	SE
Peregrine Falcon	*Falco peregrinus*	ST
Loggerhead Shrike	*Lanius ludovicianus*	ST
Henslow's Sparrow	*Centronyx henslowii*	ST
Green Floater	*Lasmigona subviridis*	ST
Migrant Loggerhead Shrike	*Lanius ludovicianus migrans*	ST

SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

7 Existing Physical Environment

7.1 Hydrology

Lake Brittle is a shallow freshwater lake situated in northern Virginia. The primary water inputs to the lake include local precipitation, groundwater, and inflow from South Run at the northwest side of the lake. The lake's outflow is regulated by control structures, which adjust based on the water level and can influence the flow conditions of South Run. South Run flows into Lake Manassas, then into Lake Jackson, followed by the Occoquan Reservoir, and eventually reaches the Chesapeake Bay. From 2017 to 2019, the average discharge from the lake was 206.2 cubic feet per second (CFS). The lake has an average depth of approximately 7 feet, with a maximum recorded depth of 25 feet.

7.2 Water Quality

Lake Brittle is included in the VADWR fertilization program designed to enhance lake productivity. The lake is treated with nitrogen and phosphorus multiple times throughout the growing season. Fertilization of Lake Brittle with nitrogen and phosphorus has been ongoing since 1954. VADWR contracted James Madison University to conduct a study between 2017 and 2019 to assess the nutrient applications. The study concluded that fertilization is essential to maintaining productivity in the lake (Downey et.al, 2024). Without such intervention, phytoplankton and fish biomass would experience a significant decline. The study concluded that ongoing monitoring of nutrient levels will need to be maintained to mitigate the risk of harmful algal blooms, which can result from nutrient excess. The study also found that the lake does not discharge significant nutrient loads into South Run, as the nutrients are either consumed by aquatic biota or

bound within the lake system. Table 7-2 illustrates the water depths and water at monitoring plots during the 2024 monitoring period.

Table 7-2: Water depth and water quality recorded in Lake Brittle during summer (7/1/2024) and fall (9/4/2024) at established monitoring plots.

	Water depth (cm)		Temp (°C)		DO (%)		Conductivity (*u*S/cm)		pH	
Plot #	July	Sept.	July	Sept.	July	Sept.	July	Sept.	July	Sept.
1	29	38	29.8	n/a	85	60	173.1	166.3	7.9	7.2
2	23	31	29.8	n/a	94	59	181.0	170.5	7.9	7.1
3	19	29	29.4	n/a	93	50	173.5	167.2	8.1	6.8
4	21	31	27.3	n/a	39	55	195.5	167.1	7.1	6.9
5	23	32	30.3	n/a	94	54	185.6	171.1	7.2	7.1
Mean	23.0	32.2	29.3	n/a	80.9	55.6	181.7	168.4	7.6	7.0

7.3 Geology and Sediments

Lake Brittle is located within the Southeastern Piedmont physiographic region. The soils in the area are predominantly loams and silt loams, with slopes ranging from 0 to 15 percent. The Lake Brittle impoundment structure is constructed into bedrock consisting of irregularly interbedded shale and sandstone. The surrounding topography is characterized by rolling hills and moderate elevations. The lakebed sediments are primarily silty, although detailed sediment composition has not been identified (USGS, 2025).

Groundwater flow is influenced by both the underlying bedrock and alluvial deposits, with fractures within the bedrock affecting subsurface water movement. Water supply in the area is provided through municipal service by the Fauquier County Water and Sanitation Authority. The New Baltimore Service Area obtains water from thirteen groundwater wells screened within fractured bedrock. The shallowest of these wells is 240 feet deep. Herbicides will be applied to plants on the surface of the lake and are not anticipated to reach groundwater or water supply wells given the relatively quick degradation of the herbicides and slow movement of groundwater.

7.4 Historic and Archaeological Resources

This section describes cultural resources within the project's area of potential effects (APE) and describes the potential effects that could occur to cultural resources that are either eligible for or listed in the National Register of Historic Places (NRHP).

Cultural resources are expressions of human activity, use, or occupation. They can be defined as manifestations of human culture and history in the physical environment such as precontact or historic period archaeological sites, buildings, structures, objects, districts, sacred sites, landscapes, among others. Cultural resources may also include aspects of natural features, plants, and animals that are deemed important or significant to a group or community. It is important to note that historic properties, as defined by 36

Code of Federal Regulations (CFR) Part 800, the implementing regulations of Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, are cultural resources that are eligible for or listed in the NRHP. Additionally, to be considered a historic property, the resource must possess at least one of the following significance criteria:
Criterion A - Association with events that have made a substantial contribution to the broad patterns of our history; or,
Criterion B - Association with the lives of persons substantial in our past; or,
Criterion C - Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a substantial or distinguishable entity whose components may lack individual distinction; or,
Criterion D - Have yielded, or may be likely to yield, information important in prehistory or history.

A historic property must also possess enough integrity to portray its significance. A resource that retains integrity will embody several, and usually most, of the seven aspects of integrity. These aspects include location, design, setting, materials, workmanship, feeling, and association.

Section 106 of the NHPA requires consultation with the State Historic Preservation Office (SHPO), federally recognized Native American tribes, and other interested consulting parties for proposed federal actions that may affect historic properties. The Virginia Department of Historic Resources (VDHR) is designated as the SHPO for Virginia. USACE initiated consultation via letter dated 5 March 2025 with the Virginia Department of Historic Resources (VDHR), Delaware Nation, Delaware Tribe of Indians, and the Fauquier County Department of Historic Preservation. The VDHR recommended that the proposed project will have no adverse effects on historic properties via e-mail dated 4 April 2025. No other responses have been received. [. Consultation letters are included in Appendix C.

As part of this evaluation, a preliminary APE was defined to identify any potential historic properties that could be affected by the proposed project alternatives. The preliminary APE includes those areas where direct impacts are proposed and areas within which the undertaking may directly or indirectly cause alterations in the character or use of historic properties, including visual effects. For this project the preliminary APE is proposed as the Lake Brittle boundary encompassing locations of proposed herbicide treatment.

USACE assessed previously identified historic properties within the APE using the VDHR's Cultural Resources Information System (VCRIS). Information gathered from VCRIS included previously identified archaeological and above-ground resources within 0.5 miles of the APE. This information is listed and discussed below.

A review of VCRIS indicates that four above-ground resources are located within 0.5 miles of the APE. One of these, the 19th century Buckland Mills Battlefield, intersects

with the APE. The remaining three resources are outside the APE boundaries. None of the resources are designated as a National Historic Landmark (Table 7-3).

Table 7-3: Resources Identified in Approximation of Lake Brittle

Resource Name (ID No.)	NRHP Eligibility	Resource Type	Description
Bergerac Farm (030-0289)	Not evaluated	Above-ground	Early 20th century rural farmstead associated with Virginia's Reconstruction and Growth (1866 - 1916) context. It has not been formally evaluated for the NRHP, although an initial surveyor's recommendation indicates that it does not possess sufficient historical or architectural significance. The resource is outside the APE and won't be affected by the proposed alternatives.
Brittle View Farm (030-5262)	Not evaluated	Above-ground	Early 19th century Greek Revival farmhouse associated with Virginia's Antebellum Period (1830 - 1860). It has not been formally evaluated for the NRHP, although an initial surveyor's recommendation indicates that it does not possess sufficient historical or architectural significance. The resource is outside the APE and won't be affected by the proposed alternatives.
Buckland Mills Battlefield (030-5152)	Eligible	Archaeological	1863 American Civil War battlefield totaling 10,375 acres. This resource is eligible for the NRHP under Criterion A. While the resource does intersect with the project's APE, it will not be affected by herbicide treatment to the water chestnut.
Sheperdstown Cemetery (030-6075)	Not evaluated	Above-ground	Rural African American cemetery of unknown date. It has not been formally evaluated for the NRHP, and an initial surveyor's assessment indicates that the cemetery is recommended for additional survey. The resource is outside the APE and won't be affected by the proposed alternatives.

Four cultural resources investigations have taken place within 0.5 miles of the APE, primarily associated with infrastructure and land development projects (Table 7-4). None of the investigations have taken place within the APE.

Table 7-4: Cultural Investigations in Approximation of Lake Brittle

Survey Name	Survey No.	Author/Year	Description
Phase I Cultural Resource Survey, Route 676 Connector Project, Fauquier County, Virginia	FQ-013	Kay Simpson and Elizabeth Rosin (Louis Berger and Associates); 1992	Phase I survey for a county transportation project. The survey documented three isolated finds and nine above-ground resources. None of the resources were eligible for the NRHP and no additional work was recommended.
Phase I Cultural Resource Investigations Report, Vint Hill Farm Station, Warrenton, Fauquier County, Virginia	FQ-019	Douglas McLearen (Virginia Commonwealth University Archaeology Research Center); 1994	Phase I survey to evaluate the Vint Hill Farm Station's NRHP eligibility. The associated above-ground resources lacked integrity and were not NRHP-eligible. Two precontact lithic scatters were documented, of which one was recommended for additional Phase II investigation. Two other previously recorded precontact sites were tested; however, both lacked integrity.
Phase I Archeological Investigation of the Wetlands Impact Areas on the Brookside Property, Fauquier County, Virginia	FQ-045	Joan Walker, Kimberly Snyder, and Gwen Hurst (Thunderbird Archaeological Associates); 2003	Phase I survey of 510 acres for areas of wetland impacts. No sites were identified.
Phase I Cultural Resources Survey at the Proposed Bishops Run Tract, Fauquier County, Virginia	FQ-077	Nancy Phaup, Aaron Levinthal, John Salmon, and Carol Tyrer (Circa Cultural Resources Management, LLC); 2010	Phase I survey of approximately 63 acres near the Buckland Mills Battlefield. The survey documented five isolated finds, one previously documented site, and a newly recorded site. No additional work was recommended.

7.5 Hazardous, Toxic, Radioactive Waste

The USEPA's National Priorities List (NPL) designates sites with national significance due to known or potential releases of hazardous substances, pollutants, or contaminants in the United States and its territories. These substances are categorized as hazardous, toxic, or radioactive waste (HTRW). The Vint Hill Wastewater Treatment Plant is located 0.2 miles downstream from Lake Brittle and has no identified violations. No additional HTRW sites are present within the project vicinity and there are no underground storage tanks (USTs).

The USEPA's Toxic Release Inventory (TRI) tracks the management of specific toxic chemicals that may pose a threat to human health or the environment. Certain industrial facilities are mandated to report annually on the quantities of chemicals recycled, combusted for energy recovery, treated for destruction, disposed of, or released both on- and off-site. Within a 5-mile radius of Lake Brittle, no facilities are subject to TRI release reporting requirements.

7.6 Noise

Noise at Lake Brittle is primarily associated with natural, recreational, and residential activities. The surrounding land use is predominantly residential and forested. The highest noise levels are attributed to the residential area, primarily from vehicular traffic and construction activities. Watercraft operating on the lake are restricted to electric trolling motors, with the exception of official VADWR vessels and other watercraft as approved by VADWR. The noise generated by VADWR motorboats represents the most significant noise source directly on the lake.

7.7 Air Quality

The Clean Air Act (CAA) establishes the framework for modern air pollution control, and delegates primary responsibility for regulating air quality to the States, with oversight by the U.S. Environmental Protection Agency (USEPA). The USEPA develops rules and regulations to preserve and improve air quality as minimum requirements of the CAA, and delegates specific responsibilities to state and local agencies. Seven specific pollutants (called criteria pollutants) have been identified to be of concern with respect to the health and welfare of the general public. The criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter 10 micrometers or less in aerodynamic diameter (PM_{10}), particulate matter 2.5 micrometers or less in aerodynamic diameter ($PM_{2.5}$), and lead (Pb). The USEPA has established the National Ambient Air Quality Standards (NAAQS) for these pollutants. Areas that do not meet the NAAQS are called non-attainment areas. For non-attainment areas, the CAA requires States to develop and adopt State Implementation Plans (SIP) (USEPA, 2024).

The area of Lake Brittle is designated as in attainment with respect to the NAAQS for

the following six criteria air pollutants: particulate matter; sulfur dioxide; nitrogen dioxide; carbon monoxide; ozone (O_3), and lead. Lake Brittle is located adjacent to the Northeast Ozone Transport Region, which requires the northeast states to submit SIPs and install certain level of controls for the pollutants that form ozone, even if they meet the ozone standards (USEPA, 2025). Non-attainment zones are areas where the NAAQS have not been met. Nitric oxide (NO), hydrocarbons, oxygen (O_2), and sunlight combine to form ozone in the atmosphere. Nitrogen oxides are released during the combustion of fossil fuels.

7.8 Socioeconomic Environment

Lake Brittle is situated in Fauquier County, Virginia, within a predominantly rural landscape characterized by forests, agricultural land, and residential areas. As of U.S. Census data from 2023, Fauquier County's population is estimated at 73,935, with approximately 77% of the population aged 18 or older. Demographically, the county is predominantly White (81%), followed by Black or African American (6.3%), and Asian (1.8%) populations. The county's poverty rate is 5.1%, which is notably lower than the national average of 11.0% for the same year. The median household income in Fauquier County is reported to be $53,576 (USCB, 2023).

Fauquier County's proximity to Washington, D.C.—approximately one hour's drive—positions it within a broader metropolitan economic network, which influences the region's economic profile. The predominant sector driving employment in the county is government, with a total of 4,458 jobs across various local, state, and federal agencies. Additional significant employment sectors include construction (2,627 jobs), retail trade (2,976 jobs), professional, scientific, and technical services (2,307 jobs), healthcare and social assistance (2,578 jobs), and food services (2,074 jobs) (USCB, 2023).

7.9 Recreation and Aesthetics

Lake Brittle offers a variety of recreational opportunities, with a primary focus on water-based activities such as boating, kayaking, canoeing, and fishing. Boating is restricted to electric-powered motors only. Targeted fish species in the lake include walleye (*Sander vitreus*), largemouth bass (*Micropterus salmoides*), and panfish species such as bluegill (*Lepomis macrochirus*). Anglers can fish from the shoreline, fishing pier, or aboard watercraft. Additionally, the lake provides designated areas for picnicking and offers boat rentals for visitors (VADWR, 2025e).

8 Environmental Consequences

8.1 Direct and Indirect Effects

This section describes the environmental effects of the preferred alternative and alternatives. Effects or impacts are changes to the human environment from the preferred alternative or alternatives. Impacts can be beneficial or adverse, can be a

primary result of an action (direct) or a secondary result (indirect), and can be permanent/long-term or temporary/short-term. Indirect effects are effects that occur later in time or are further removed in distance but are still reasonably foreseeable. Impacts can vary in degree from minor and temporary to significant and permanent. All identified impacts resulting from the treatment of two-horned water chestnut with aquatic herbicides are addressed in the succeeding sections.

8.2 Reasonably Foreseeable Impacts

Cumulative impacts are those resulting from the incremental impact of the preferred alternative when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time. Relevant past and current activities in Lake Brittle include previous aquatic invasive plant treatment, nutrient amendments to increase sport fish production, and recreational activities.

Reasonably foreseeable future actions include the continuation of the abovementioned activities. The cumulative impacts on the affected environment are included within each section of the environmental consequences.

9 Evaluated Biological Environment Impacts

Herbicides included in the preferred alternative have been evaluated by EPA and concluded if products are applied per label instructions, treatments may affect, but not likely to adversely affect, which is defined as effects that are beneficial, insignificant, or extremely unlikely to occur. Significant long term health risks to aquatic organisms, pollinators (e.g., bees), birds, reptiles, amphibians, or mammals are unlikely to occur.

9.1 Wetlands

Under the no action alternative, two-horned water chestnut it is anticipated that there will be insignificant direct, indirect, and cumulative impacts. Two-horned water chestnut would continue to spread throughout the littoral zone within Lake Brittle, and to any wetlands that surrounds the lake. Without management, water chestnut will outcompete native vegetation and alter water conditions that will lead to less diverse wetlands, reducing important ecosystem services such as fish and wildlife habitat, carbon sequestration, and others. Further, under the no action alternative, the effectiveness of herbicide treatment will not be evaluated and guidance on best practices to effectively treat the two-horned water chestnut in effected wetlands will not be developed. As a result, not only Lake Brittle, but other sites impacted by two-horned water chestnut infestations will continue to be negatively impacted by the infestations.

The preferred alternative is anticipated to have insignificant direct and indirect impacts to wetlands. Controlling two-horned water chestnut to levels that prevent encroachment into wetlands and that maintain densities that preserve the wetlands' integrity results in beneficial impacts to these ecosystems. Herbicide concentrations and the timing of

treatment are unlikely to cause a significant effect on wetlands adjacent to the test plots. The treatment may affect susceptible plants that are on the fringe of the treatment areas by killing the aboveground material, but these impacts will be temporary as plants would recover the following growing seasons from rhizomes or propagules. Selective herbicide treatments do not kill native plant seed banks nor non-exposed rhizomes. In addition, the applicator will minimize effects to surrounding native vegetation by targeting the two-horned water chestnut. Vegetation within the treatment areas will be monitored after treatment to determine impacts to non-target submerged and emergent vegetation. No anticipated long-term adverse or cumulative impacts are anticipated from the preferred alternative.

9.2 Floodplains

Both the no action and preferred alternatives do not alter the physical attributes of the floodplain. Temporary vegetation disruptions, such as non-significantly impacting native vegetation under the preferred alternative, may have a minor affect the rate of runoff and absorption in the floodplain.

9.3 Aquatic Vegetation

The no action alternative will have direct, indirect and cumulative impacts to aquatic vegetation. Without the preferred alternative, two-horned water chestnut will continue to spread throughout Lake Brittle, outcompeting native aquatic vegetation such as American waterweed (*Elodea canadensis*) and pondweeds (*Potamogenton* spp.), which provide suitable food and habitat to native fish and wildlife species and their prey. Under the no-action alternative, the lake's ecosystem would be severely impacted.

The preferred alternative involving the application of imazamox, flumioxazin, and florpyrauxifen-benzyl, is anticipated to have direct and indirect short-term impacts to aquatic vegetation at a treatment site. Monitoring will occur after treatments to understand the efficacy of the herbicide treatments to control two-horned water chestnut and understand the impacts (if any) to non-target aquatic vegetation. Common native aquatic plants, such as American waterweed (*Elodea canadensis*) and pondweeds (*Potamogenton* spp.) have a range of sensitivities to these herbicides and may be impacted by the two-horned water chestnut treatment as discussed below but are likely able to recover in the following growing seasons. Since two-horned water chestnut is an annual that reproduces by seed, optimal timing of herbicide applications is prior to fruit production or maturation to prevent seed production. The herbicide treatment plans proposed for each site are based on two main factors that limit impacts to native species: 1) anticipated herbicide CETs to effectively and selectively control two-horned water chestnut; and 2) the chosen herbicide and concentration to prevent impacts to non-target plants in the treatment area. Selective herbicides do not kill all plants so repeated herbicide use will be selective even when used over multiple years.

Flumioxazin is a rapid-acting herbicide that induces swift mortality in susceptible plant species. Native aquatic plants such as coontail (*Ceratophyllum demersum* L.) and American eelgrass (*Vallisneria americana* M.), which possess the ability to disperse via

seeds or rhizomes, may experience herbicide-induced injury from fast-acting herbicides under certain CET conditions. However, these species typically demonstrate recovery or reestablishment within the current growing season or the following season (Dodd et al. 2022; Mudge & Haller, 2010). In the context of Lake Brittle, reestablishment of native vegetation is anticipated to occur under the proposed treatment scenario, provided that the treatment plan effectively controls two-horned water chestnut. If two-horned water chestnut is inadequately controlled, it will continue to outcompete native plant species. Native species identified as susceptible to flumioxazin include duckweeds (*Lemna* spp.) and pondweeds (*Potamogeton* spp.). The impact on native species will vary depending on the specific native species affected and the concentration of flumioxazin applied (Glomski et.al., 2013). For this demonstration project, only the lowest rates required to control two-horned water chestnut will be used.

Imazamox and florpyrauxifen-benzyl are systemic herbicides that translocate within plants, affecting both aboveground and belowground structures. Native aquatic plants exhibit varying levels of sensitivity to these herbicides. A study conducted by the Vermont Department of Environmental Conservation (2022) evaluated the effects of two treatments of florpyrauxifen-benzyl across eleven Vermont lakes. The study found that the target invasive species, Eurasian watermilfoil (*Myriophyllum spicatum*), experienced a significant decrease in frequency of occurrence, while most native vegetation showed no significant change. Similarly, a study on the impact of imazamox on southern cattail (*Typha domingensis*) in the Florida Everglades indicated that imazamox was effective in controlling southern cattail populations but had minimal effects on native macrophytes. The study also suggested that imazamox may serve as a preferred alternative to glyphosate, as it demonstrates greater selectivity for target species (Rodgers et.al., 2012).

Any minor cumulative impacts on aquatic vegetation are expected to be beneficial from the preferred alternative. The herbicides proposed are primarily selective towards water chestnut and other aquatic invasive plants. If these herbicides are used to manage two-horned water chestnut in the future, two-horned water chestnut populations will decrease in size and native aquatic vegetation will reestablish and dominate the area, returning the area to more natural vegetation communities.

9.4 Benthic and Shellfish Resources

Under the no action alternative, two-horned water chestnut will continue to spread and form dense stands throughout the lake. This will have indirect and cumulative impacts to benthic and shellfish organisms within Lake Brittle. The spread of two-horned water chestnut will severely limit the passage of light and reduce oxygen levels, which may cause impacts to aquatic macroinvertebrates and shellfish throughout the lake. Overall, changes in light penetration can result in cascading disruptions to the lake's ecosystem.

The preferred alternative is not anticipated to have significant direct or indirect adverse effects on benthic organisms and shellfish. Treatment of two-horned water chestnut by use of herbicides will limit the impacts of other control methods that are not as effective

and would cause physical removal or disturbance to benthic and shellfish resources. Native aquatic vegetation will reestablish where there was two-horned water chestnut, providing natural habitat to host fish species.

The proposed herbicides have passed comprehensive USEPA risk assessment processes for registration of aquatic use at both the state and federal levels (USEPA, 2008; USEPA, 2011; USEPA, 2017). These decisions are based on field and laboratory studies and observations that analyze whether the active ingredient causes unreasonable risk to humans or the environment, including determining toxic concentrations for aquatic invertebrates. Registration of the herbicides and application according to label instructions by a licensed applicator and under the conditions of Virginia General Permit (VAG87) for pesticide application will limit lasting adverse impacts to the invertebrates that may be present.

The three herbicides considered for use under the preferred alternative, imazamox, flumioxazin, and florpyrauxifen-benzyl, have varying degrees of acute risks to invertebrates but any impacts are minimal. All chemicals will be applied according to label directions and will be directly applied to targeted plants, minimizing drift and not applied in adverse weather conditions. A certified VDACS herbicide applicator will oversee herbicide applications. The information sheets located in Appendix D for some of the potential commercial products identified the chemicals to be “highly toxic”; however, did not specify what they are toxic to (humans, wildlife, etc.). However, the USEPA has identified these chemicals as “practically non-toxic” to a broad spectrum of aquatic life including benthic and shellfish species.

Since imazamox primarily targets an enzyme found exclusively in plant species, the USEPA has determined that it is virtually non-toxic to aquatic invertebrates (USEPA, 2008). Similarly, a study evaluating florpyrauxifen-benzyl impact on juvenile fatmucket (*Lampsilis powellii*) and Eastern lampmussel (*Lampsilis radiata*) determined that this compound was toxic, but not acutely toxic or lethal to juveniles of these species (Buczek et al., 2020). Based on the studies characterizing the risks to benthic and shellfish resources, adverse impacts to these resources resulting from the preferred alternative are expected to be minimal.

Flumioxazin undergoes rapid degradation in water, light, and under microbial influence. However, direct exposure to the compound has been identified as moderately toxic to benthic species. During the short-term exposure to flumioxazin, growth of benthic larvae may be adversely affected (WDNR, 2022b).

The three proposed herbicides do not bioaccumulate in organisms and will be applied no more than two times (as applicable) during the summer of 2025 (WDNR, 2018a; WDNR, 20218b; WDNR, 2022).

While there may be temporary non-significant negative impacts from herbicide application, it is expected that native species will rebound and benefit from the improved habtitat conditions resulting from control of the two-horned water chestnut. No

cumulative impacts are expected as a result of the preferred alternative.

9.5 Fish and Wildlife

Under the no action alternative, two-horned water chestnut would continue to grow uncontrolled, displacing native aquatic vegetation. Invasive aquatic plants can be beneficial to fish and other wildlife in the same way that natives are by providing surfaces for algae and small animals to live that serve as food and providing structure for cover and shelter (UF/IFAS, n.d.). However, invasive aquatic plants like water chestnut will often exceed densities of native aquatic vegetation while expanding into areas that do not contain natives at all. This can concentrate fish and wildlife into small areas of open water which exposes them to predators and limits their use of available habitat (UF/IFAS, n.d.).

As mentioned in previous sections, the herbicides considered under the preferred alternative have passed comprehensive USEPA risk assessment processes for registration of aquatic use at both the state and federal levels (USEPA, 2008; USEPA, 2011; USEPA, 2017). They are not anticipated to have significant, lasting effects on fish and wildlife resources. However, some aquatic organisms that are plant-dwelling may be adversely affected temporarily due to habitat loss following herbicide treatment (WDNR, 2012b). These impacts are expected to be minimal since aquatic organisms will be able to relocate to other locations within the lake and native plant species will reestablish in the next growing season.

Imazamox has relatively low toxicity to fish and does not bioaccumulate in fish tissue (WDNR, 2022a). In particular, the USEPA (2015) found imazamox did not significantly accumulate in bluegill sunfish (*Lepomis macrochirus*), with whole and edible tissue indicating less than the minimum quantifiable limit. The results of acute exposure studies on this freshwater fish and freshwater invertebrates (*Daphnia magna*) have been summarized as practically non-toxic (USEPA, 2008; USEPA, 2015). No significant adverse effects are anticipated for the fish species of concern in the project area given that the proposed application rates are within the concentration limits specified on the USEPA-approved herbicide. Flumioxazin is not expected to have long-term impacts on fish and wildlife resources. Under short-term conditions and below the maximum label rate, flumioxazin is slightly to moderately toxic to freshwater fish, with potential effects on larval growth (WDNR, 2022b). However, given the one-to-four-day half-life and the low octanol-water partition coefficient of flumioxazin, the potential for bioaccumulation is low (USEPA, 2001). Florpyrauxifen-benzyl is considered to be practically non-toxic to freshwater fish (WDNR, 2022c; Levey, 2022; USEPA, 2017). Studies of florpyrauxifen-benzyl impacts on fish and aquatic organisms largely did not observe toxicity even when applied up to its functional limit of solubility (Levey, 2022; USEPA, 2017). Results of bioaccumulation studies in fish suggested rapid and extensive metabolism of florpyrauxifen-benzyl, indicating that bioaccumulation potential for this herbicide is low (USEPA, 2017). The proposed herbicide application rates are at or below the maximum allowable concentration as indicated on USEPA-approved product labels at which neither acute nor lethal toxicity in fish has been previously demonstrated. Further,

chronic toxicity in these species is also not considered to be a concern as the proposed treatment activity only includes two herbicide applications, and florpyrauxifen- benzyl has been shown to rapidly degrade through aerobic aquatic metabolism and aqueous photolysis once applied (USEPA, 2017).

With respect to potential effects on reptiles, imazamox, flumioxazin, and florpyrauxifen-benzyl pose no risk of acute toxicity. According to the USEPA's Ecological Risk Assessment on imazamox and flumioxazin, birds were used as a surrogate for reptiles and terrestrial-phase amphibians (USEPA, 2008; USEPA, 2020). Based on USEPA's Environmental Fate and Ecological Risk Assessment for florpyrauxifen-benzyl, even at levels greater than the maximum application concentration, the herbicide is non-toxic to reptiles (USEPA, 2017). We expect that these results translate to the effects on reptile species that are present within Lake Brittle.

Similarly, impacts to amphibians are expected to be insignificant. In the case of imazamox and flumioxazin, the USEPA used birds and/or freshwater fish as a surrogate for aquatic-phase amphibians given taxa-specific toxicity data was not available (USEPA, 2008; USEPA, 2020). Based on USEPA's Environmental Fate and Ecological Risk Assessments for florpyrauxifen-benzyl, the herbicides are non-toxic to amphibians (USEPA, 2017).

The risk of acute impacts to birds from the proposed treatment activities using imazamox, flumioxazin, and florpyrauxifen-benzyl are expected to be low. Imazamox was found to be essentially non-toxic to birds and mammals (WDNR, 2022a; USEPA, 2008). Flumioxazin is practically non-toxic to birds and small mammals on a short-term exposure basis (WDNR, 2022b). The risk of acute impacts of florpyrauxifen-benzyl to birds is also considered to be low. Florpyrauxifen-benzyl has been shown to be acutely non-toxic to multiple bird species (Levey, 2022; USEPA, 2017). Therefore, no long-term direct, indirect, or cumulative effects are expected as a result of the preferred alternative.

9.6 Threatened and Endangered Species

9.6.1 Monarch Butterfly

No effects to monarch butterflies (*Danaus Plexippus*) will occur as a result of the no action alternative or the preferred alternative. While USFWS IPAC has identified proposed critical habitat (milkweed) in the project area, the herbicides will only be applied to the aquatic two-horned water chestnut and will not be applied to terrestrial plants. Proper application methods to reduce chemical drift will be employed to mitigate the risk of impacts to non-target species. As a result, there are no anticipated impacts on monarch butterflies.

9.6.2 State-Listed Species

Under the no action alternative, state-listed species are expected to be adversely

impacted. Water chestnut may displace or outcompete native rare plant species since water chestnut can grow unchecked without natural predators. The expansion of two-horned water chestnut will convert habitat that supports state-listed wildlife, limiting available shelter and forage resources.

Application of herbicides will be applied based on product label and therefore, the preferred alternative is expected to have an insignificant direct beneficial effect by managing two-horned water chestnut populations, which will enhance habitats for certain state-listed species. Studies of all herbicides have indicated that the treatments pose no significant health risks to aquatic organisms, pollinators (e.g., bees), birds, reptiles, amphibians, or mammals.

10 Physical Environment Evaluated Impacts

10.1 Hydrology

Under the no action alternative, water chestnut will persist in expanding throughout the lake, forming dense stands and mats that could impact the hydrology of the lake through alteration of water flow, sediment transport, and impacts to nutrient cycling. The preferred alternative may result in nonsignificant impact lake hydrology by providing for a more natural flow and sedimentation regime.

10.2 Water Quality

Without management of two-horned water chestnut, there may be indirect and cumulative impacts to water quality. Water quality will decline in the areas where it is present due to its ability to change natural temperature, pH, and dissolved oxygen of the system. The fluctuations in these measures can contribute to the release of nutrients, such as phosphorus, from the sediments. There would continue to be a seasonal decrease in dissolved oxygen when water chestnut senesces and decomposes causing harm and imbalances over the long-term. These factors can contribute to large algal blooms causing eutrophication and fish kills (Hou et al., 2013). No direct impacts are expected to occur as a result of the no action alternative.

The preferred alternative may have direct and indirect impacts to water quality. Short-term insignificant adverse impacts would occur, including the temporary increase in turbidity due to the decomposition of two-horned water chestnut as well as a short-term decrease in dissolved oxygen due to the death and decomposition of two-horned water chestnut from herbicide treatment. Two-horned water chestnut dieback from the preferred alternative will result in a localized increase in baseline turbidity but these conditions will be more natural as the native vegetation community and density is restored. The short-term decrease in dissolved oxygen will be temporary and the effects would be localized to treatment areas for a short period of time.

Herbicides may adsorb to the sediments or persist in water bodies for varying durations,

depending on environmental conditions. Imazamox exhibits persistence in anaerobic environments, particularly in deeper waters. However, in shallow waters where photolysis can occur, its half-life is approximately seven hours (MDA, 2014; USEPA, 2015). Florpyrauxifen-benzyl degrades through photolysis and microbial activity within one to six days (WDNR, 2022). However, field dissipation studies of florpyrauxifen-benzyl at 50 ppb in Florida and North Carolina indicated half-lives of 1.4 to 2.3 days (MDA & MDEP, 2019). Flumioxazin has a half-life in water of approximately one to four days (USEPA, 2003). Long-term beneficial effects on water quality are anticipated following two-horned water chestnut treatment, including the restoration of naturally occurring water temperatures, pH levels, and dissolved oxygen concentrations. Due to the dam impoundment, outflow from Lake Brittle is restricted, resulting in relatively slow discharge rates. This allows applied herbicides ample time to degrade significantly before exiting the lake. This treatment along with the fertilization of the lake is not expected to have long term adverse cumulative effects.

10.3 Sediments

The no action alternative may have direct and indirect adverse impacts to sediments located within the lake. Two-horned water chestnut will continue to impact the accumulation of sediments in Lake Brittle, affecting the natural deposition and movement of sediment in the environment.

The preferred alternative of applying herbicides to the aquatic environment for the treatment of two-horned water chestnut would have no direct and indirect impact to sediments. The herbicides currently proposed for use either adsorb onto sediments and deactivate, becoming biologically unavailable and causing no toxicity or biological harm to organisms in the system, or degrade by light and microbes.

Imazamox exhibits mobility across various soil types; however, in shallow surface waters, it is expected to degrade primarily through photolysis. In deeper waters, particularly in anaerobic environments, imazamox may persist for extended periods (MDA, 2014).

Flumioxazin undergoes rapid photodegradation in water and is metabolized relatively quickly in aerobic soils. In anaerobic conditions, its degradation is accelerated, with a half-life of approximately four days (USEPA, 2003).

Florpyrauxifen-benzyl is efficiently absorbed by plant tissues and adsorbs to soil and sediments, exhibiting a half-life ranging from two to six days (WDNR, 2022c). In shallow and clear waters, florpyrauxifen-benzyl primarily degrades through aqueous photolysis. In soils, the parent compound demonstrates high binding affinity to sediments and low mobility once bound (MDA & MDEP, 2019). The reduction of two-horned water chestnut populations within the system will contribute to the restoration of sediment dynamics, thereby enhancing the lake's ecological function and improving habitats for fish and wildlife.

Based on the half-lives of the proposed herbicides, no significant cumulative impacts are anticipated from the preferred alternative because the residual herbicide will be degraded before the sites are considered for treatment again. Removal of two-horned water chestnut may alter nutrient levels within the lake. VADWR will continue to monitor nutrient levels and apply fertilizers nitrogen and phosphorous to maintain lake biotic productivity.

10.4 Cultural Resources

Under the no action alternative, there would be no change in the current conditions within Lake Brittle. Control of the two-horned water chestnut would not occur and the plant would continue to inhabit and spread throughout Lake Brittle and surrounding areas. Cultural resources along the river and within coves and other waterbodies could potentially be impacted by flooding and damage to banks and bank erosion if the two-horned water chestnut is allowed to continue to proliferate.

Impacts to cultural resources are not anticipated from the preferred alternative. While four cultural resources have been previously identified within 0.5 miles of the APE, three of these are outside of the current project area and would not be impacted. The fourth resource, the NRHP-eligible Buckland Mills Battlefield, intersects with the APE; however, herbicide application will not impact any aspects of integrity or character-defining features that contribute to its significance, such as the ability to convey troop movements and approaches, or the preservation of landscape, roadways, and fencing. Site access and staging areas, if any, will be coordinated with the SHPO and tribal nations to utilize previously disturbed areas. The VDHR recommended that the proposed project would have no adverse effect on historic properties via e-mail dated 5 April 2025. No other responses have been received. .

10.5 Hazardous, Toxic, Radiological Waste

The no action alternative will have no direct or indirect or cumulative impacts related to HTRW.

The preferred alternative will have no significant impacts. There will be no impacts to any USTs or HTRW sites located in or near the project areas as the preferred alternative only involves the application of herbicides to the waters. The herbicides that will be used under the preferred alternative are not anticipated to pose any risk to the environment or humans. The herbicides will be stored in approved locations that comply with applicable regulations, standards, and policies. The herbicides will be transported, handled, and applied in accordance with USEPA approved label instructions. All individuals conducting the herbicide treatments will be certified pesticide applicators and knowledgeable of appropriate actions to take should a spill occur or accidental exposure to the herbicides. For all of the proposed herbicides, there are no restrictions for recreational purposes, including swimming and fishing. For flumioxazin-based products (e.g., Flumigard SC), irrigation restrictions include a 5-day waiting period for food crops

and 12-hour period for turf and landscape ornamentals when treated areas have an average water depth of less than 3 ft. However, Lake Brittle is not utilized for irrigation purpose, thus restrictions of irrigation are not applicable. For products containing florpyrauxifen-benzyl (e.g., ProcellaCOR SC), irrigation restrictions are dependent on area and rate of treatment, and vegetation being irrigated. There is a 1-day waiting period for herbaceous landscape vegetation at an herbicide rate greater than 1-2 Prescription Dose Unit (PDU) per acre on treated areas of 10% or less of the total waterbody surface. For irrigation of food crops, there is a 24-hour period for grains and residual concentrations must be less than 1 ppb for vegetables. Residual concentrations of imazamox (e.g. Clearcast) must be less than or equal to 1 ppb for irrigation of greenhouses, nurseries, hydroponics, golf courses, vineyards, and sod farms. For both flumioxazin and florpyrauxifen-benzyl, there are no drinking water restrictions post-application. For imazamox, potable water consumption is allowable for applications up to 500 ppb if the water intake source is greater than or equal to ¼ mile from the treatment area and up to 50 ppb if within that same distance to the treated area.

The lake is not an anaerobic environment, and herbicides are expected to degrade within days. Additionally, the lake is impounded, so outflow is slowed, such that degradation of herbicides is expected before water or sediment leaves the lake. As discussed in Section 7.3, water supply in the area is serviced by the Fauquier County Water and Sanitation Authority from groundwater wells screened within bedrock. The shallowest supply well is located at a depth of 250 feet. Given the quick degradation of the herbicides, no herbicides are expected to impact groundwater and/or water supply.

10.6 Air Quality

The no action alternative will have no impacts to air quality. The existence and spread of two-horned water chestnut is not anticipated to directly affect air quality over the short or long-term.

The preferred alternative will have negligible temporary direct effects to air quality. The proposed treatments will produce temporary localized emission increases from the boat's 90 horsepower (HP) four-stroke outboard engine or 350HP motor and 2.0-inch 223-cylinder capacity gasoline pump spray system working onsite. Herbicide applications will be carried out under optimal conditions and in strict accordance with product labels and the guidelines outlined in Virginia's Pesticide General Permit (9VAC25-800; VAG87) to minimize the risk of aerosolization and chemical drift. These localized emission increases will last only during the project's work and monitoring period and end when the herbicide applications and monitoring is over. Based on a qualitative assessment of the construction requirements, it is anticipated that this project will be below the de minimis thresholds under the Clean Air Act for air quality impacts in any one year. The preferred alternative would have a de minimis impact of the cumulative effects.

10.7 Noise

Under the no action alternative, there would be no direct, indirect, or cumulative impacts to the noise environment.

Under the preferred alternative, a portion of the Lake Brittle treatments will be applied using a 20-foot aluminum skiff with a 90 horsepower (HP) four-stroke outboard engine with a spray system consisting of a 100-gallon tank and 2.0-inch 223 cylinder capacity gasoline pump or 16-foot airboat with a 350HP motor with the same spray system described above. Low density target plant areas will consist of application with a backpack sprayer with manual or battery-powered pump. The noise levels from the application equipment will not exceed 100 decibels and would last for one day and only twice in a calendar year. Post-treatment monitoring would be performed from Jon boats with appropriate engines, that would be similar to recreational vessels that may be in the area. The addition of the monitoring vessels to each site for the duration of monitoring activities is not expected to significantly increase the noise above baseline conditions. Noise impacts from the equipment used to treat the invasive aquatic plants would be direct and short-term and would cease after herbicide applications and monitoring activities are complete. There would be insignificant indirect, long-term, or cumulative impacts to noise levels associated with the preferred alternative.

10.8 Socioeconomic Environment

Under the no action alternative, the spread of two-horned water chestnut throughout Lake Brittle is expected to have a minor impact on the local economy. As two-horned water chestnut populations increase, recreational opportunities such as fishing and boating could be impacted, resulting in the decrease of boat rentals that can be acquired at Lake Brittle.

The preferred alternative is anticipated to yield insignificant beneficial socioeconomic impacts. By removing two-horned water chestnut from Lake Brittle, dense mats will be prevented, facilitating easier access for fishing and boating activities. Boat rentals will remain unaffected by two-horned water chestnut, and fishing areas will continue to be accessible and utilized.

Executive Order 13045, “Protection of Children from Environmental Health Risks and Safety Risks,” requires federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children. No significant adverse impacts to children are anticipated as a result of the preferred alternative. The proposed project is to manage an aquatic invasive species that impacts the local economy and environment thus improving those elements of the community. No significant effects to minorities, those below the poverty line, or children are expected as a result of the management of two-horned water chestnut within Lake Brittle.

10.9 Recreation and Aesthetics

Under the no action alternative, direct, indirect and cumulative impacts to recreation and aesthetics are expected to occur. Two-horned water chestnut would continue to spread throughout Lake Brittle causing direct impacts to the accessibility of the lake to recreational activities such as paddling, boating, and fishing. Boat launches along the lake would be blocked and would likely be closed. The spread of two-horned water chestnut and the dense mats it forms on the surface of waterbodies would decrease the aesthetic value of the lake.

Lake Brittle is heavily utilized for recreational sport fishing and has a boat ramp and dock that supports regional and local recreational fishing. Recreational vessels, including electric trolling motor-supplied vessels, kayaks, and canoes, used by locals and tourists, also benefit from the lake. Use of larger watercraft is authorized by VADWR on a situational basis. Clogged waterways will limit access to recreational areas and opportunities that benefit the communities and local economies through tourism and local businesses that provide access to the lake. In addition, the clogged waterways may lead to safety concerns as it causes boats to breakdown and/or get stranded. Additionally, two-horned water chestnut will cause further degradation of the native aquatic plant assemblages in Lake Brittle, negatively impacting the native fish and wildlife that use the lake for habitat. Further, private property owners may suffer the costs of managing this plant and experience a decrease in aesthetic value or inability to use and enjoy their property.

Short-term insignificant direct impacts to recreation will result from the preferred alternative as sections of the lake system may be closed during the treatment activities for public safety. The impacts are expected to be minimal and temporary, as treatment areas will likely be relatively small and will be reopened once the application is complete and the chemicals have fully dried (expected within 2-hours of foliar application). Indirect beneficial impacts to recreation and aesthetics will occur as a result of the preferred alternative. The treatment of two-horned water chestnut will decrease population sizes, shrinking current patches and mats of two-horned water chestnut within the lake and contribute to the prevention of the spread to other parts of the lake, maintaining and reopening access to the lake for water-based recreational activities. The aesthetic value of the lake would be improved and resemble its previous condition prior to the introduction of two-horned water chestnut.

11 Actions Taken to Minimize Impacts

The following actions aim to minimize direct and indirect impacts of herbicide applications based on Best Management Practices (AERF, 2020) and environmental conditions at Lake Brittle.

1. All herbicide applications will adhere to USEPA label requirements.
2. Pre- and post-treatment monitoring will occur to assess the efficacy of the herbicide treatments and non-target impacts (Appendix B).

3. Monitoring includes capturing water quality data to ensure dissolved oxygen levels remain within an optimal range following target plant die-off.
4. In areas where mixed stands of non-target and target species occur, the appropriately selective herbicide will be used to provide more targeted treatment of two-horned water chestnut.

12 Agency, Tribal, and Public Coordination

A 30-day Public Notice describing the preferred alternative will be published to allow for public and agency comment. Appendix C contains supporting documentation that was collected during preparation of this EA. The agencies and organizations listed below were coordinated with as part of the preparation of this EA.

Federal

- U.S. Environmental Protection Agency- Email and telephonic coordination Dated 03 March 2025
- U.S. Fish and Wildlife Service- IPAC Report Run Dated:11 April 2025

State of Virginia

- Virginia Department of Wildlife Resources- Email coordination Dated:25 February 2025
- Virginia Department of Agriculture and Consumer Services- Email coordination Dated:25 February 2025
- Virginia Department of Historic Resources-Correspondence Letter Dated 03 March 2025

Tribal Nations

- Delaware Nation- Correspondence Letter Dated 03 March 2025
- Delaware Tribe of Indians- Correspondence Dated 03 March 2025

13 Environmental Compliance

This section describes the Federal laws, regulations and programs that are relevant to the project and preferred alternative (Table 13-1 and 13-2).

Table 13-1: Compliance of the Preferred Alternative with Applicable Federal Laws

Law or Regulation	Compliance with Regulation/Law
Bald and Golden Eagle Protection Act	No bald eagle nests have been documented on Lake Brittle (The Center for Conservation Biology, 2022). The preferred alternative is highly unlikely to affect bald eagles.
Clean Air Act (CAA)	Emissions from the preferred alternative will be below the de minimis levels in any one year. Negligible, temporary emissions during treatment will occur.
Clean Water Act (CWA)	The preferred alternative contains herbicides that have been approved by the USEPA for aquatic application. Minor direct impacts will occur during application.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	N/A. The application of the herbicides are not a spill of a waste subject to CERCLA because they are being properly applied per label. Such activity falls under FIFRA.
Endangered Species Act (ESA)	Coordination with USFWS through IPaC is complete. No effects are anticipated to listed species. Further consultation is not required. See Appendix C.
Farmland Protection Policy Act	The preferred alternative will have no effects on prime farmland or farmland of statewide importance.
Insecticide, Fungicide and Rodenticide Act	All herbicides utilized in the preferred alternative are registered for aquatic use by EPA and is a registered chemical in the commonwealth of Virginia.
Migratory Bird Treaty Act	There would be no taking of any migratory or protected species with preferred alternative.
Fish and Wildlife Coordination Act (FWCA)	Completed via USFWS IPaC. No FWCA Report necessary. See Appendix C.
National Environmental Policy Act (NEPA)	This document follows NEPA of 1969, as amended, and 33 CFR Part 230, Procedures for Implementing NEPA.
National Historic Preservation Act (NHPA)	Coordinated with the SHPO and American Indian Tribes on 5 March 2025 via letter to fulfill requirements (Appendix C).
Noise Control Act	With the preferred alternative, temporary noise increases would occur with Lake Brittle and the direct adjacent areas. The preferred alternative will occur during daylight hours.

Resource Conservation and Recovery Act (RCRA)	N/A The herbicides used are not a waste being properly applied per label. Such activity falls under FIFRA. If disposal of any hazardous waste is required, it will be done in compliance with RCRA.
River and Harbors Act	N/A The preferred alternative does not include dredging or disposal of dredged materials.
National Invasive Species Act (NISA)	This project focuses on the management of an invasive aquatic plant species. The project will not promote or cause the introduction or spread of invasive species into waters of the United States.
Water Project Recreation Act	Lake Brittle is not a federal listed waterbody.
Wild and Scenic Rivers Act	N/A Lake Brittle or any inflow or outflow waterbodies are not identified as a Wild or Scenic River.

Table 13-2: Compliance of the Preferred Alternative with Applicable Executive Orders

Executive Order Content and Number	Demonstration of Compliance
EO 11593 Protection and Enhancement of Cultural Environment	Coordination with the State Historic Preservation Officer signifies compliance.
EO 11988 Floodplain Management	Public notice of the availability of this report or public review fulfills the requirements of Executive Order 11988, Section 2(a)(2).
EO 11990 Protection of Wetlands	This project does not include construction in wetlands and preserves and enhances the value of these natural systems by controlling invasive aquatic plants.
EO 13007 Indian Sacred Sites	Coordination with tribal interests occurred on March 5th, 2025. Comments responses are pending
EO 13045 Protection of Children from Environmental Health Risks and Safety Risks	The project will not create a disproportionate environmental health or safety risk for children.
EO 13508 Chesapeake Bay Watershed	This project will improve the Chesapeake Bay Watershed by improving water quality with the eradication of water chestnut. The project will not hinder the goals of the Chesapeake Bay Agreement.
EO 13751 Safeguarding the Nation from the Impacts of Invasive Species	Will be addressed by implementing best management practices during construction including equipment specifications including methods to reduce spread of invasive species.
EO 13186 Migratory Birds	Preferred actions will not have a negative impact to migratory birds or their habitat.
EO 11514 Protecting and Enhancing Environmental Quality	The preferred alternative involves the removal of the invasive two-horned water chestnut, which would promote the recovery and diversity of native plant species. This action is expected to enhance overall environmental quality.
EO 13112 Invasive Species	The preferred alternative involves removing the invasive two-horned water chestnut, thereby promoting ecological diversity within Lake Brittle.

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Appendix A

Common Wetland Plants of Northern Virginia's Piedmont * - weedy or noxious invasive species	
Common name	**Scientific name**
Ferns	
sensitive fern	*Onoclea sensibilis*
cinnamon fern	*Osmunda cinnamomea*
Grasses, Sedges, and Rushes	
reed canarygrass*	*Phalaris arundinacea*
fowl mannagrass	*Glyceria striata*
roughstalk bluegrass*	*Poa trivialis*
rice cutgrass	*Leersia oryzoides*
jointhead arthraxon*	*Arthraxon hispidus*
Japanese stilt grass*	*Mircostegium vimineum*
cattails	*Typha spp.*
common reed*	*Phragmites australis*
sallow sedge	*Carex lurida*
fox sedge	*Carex vulpinoidea*
tussock sedge	*Carex stricta*
woolgrass	*Scirpus cyperinus*
green bulrush	*Scirpus atrovirens*
softstem bulrush	*Scirpus validus*
spikerushes	*Eleocharis spp.*
soft rush	*Juncus effusus*
sweetflag	*Acorus calamus*
Forbs	
skunk cabbage	*Symplocarpus foetidus*
cardinal flower	*Lobelia cardinalis*
jewelweed	*Impatiens capensis*
monkey flower	*Mimulus ringens*
water plantain	*Alisma subcordatum*
seedbox	*Ludwigia alternifolia*
willow herbs	*Epilobium spp.*
water purslane	*Ludwigia palustris*
New York ironweed	*Vernonia noveboracensis*
smartweeds	*Polygonum spp.*
tearthumbs	*Polygonum spp.*
blue vervain	*Verbena hastata*
New England aster	*Aster novae-angliae*
swamp aster	*Aster puniceus*
joe pye weed	*Eupatorium fistulosum*
boneset	*Eupatorium perfoliatum*
beggars-ticks	*Bidens spp.*
false nettle	*Boehmeria cylindrica*

Woody Vines	
poison ivy	*Toxicodendron radicans*
common greenbrier	*Smilax rotundifolia*
Shrubs	
smooth alder	*Alnus serrulata*
winterberry	*Ilex verticillata*
spicebush	*Lindera benzoin*
highbush blueberry	*Vaccinium corymbosum*
southern arrowwood	*Viburnum dentatum*
silky dogwood	*Cornus amomum*
buttonbush	*Cephalanthus occidentalis*
common elderberry	*Sambucus canadensis*
swamp rose	*Rosa palustris*
Trees	
red maple	*Acer rubrum*
silver maple	*Acer saccharinum*
green ash	*Fraxinus pennsylvanica*
box elder	*Acer negundo*
sycamore	*Platanus occidentalis*
swamp white oak	*Quercus bicolor*
pin oak	*Quercus palustris*
black gum	*Nyssa sylvatica*
black willow	*Salix nigra*
river birch	*Betula nigra*

Appendix B

Appendix B. Water Chestnut Control R&D Demonstration Project 2025 Pre- and Post-Treatment Monitoring Plan

VEGETATION MONITORING METHODS (adapted from Madsen 1999, Hauxwell et al. 2010)
Pre- and post-treatment aquatic vegetation surveys will be conducted to determine plant response and changes in submersed aquatic vegetation (SAV) community (distribution, cover, and species richness). Transects and point-intercepts will be used for mapping aquatic vegetation.

1. Surveys will be conducted 4 – 6 WAT (weeks after treatment) and 12 WAT.
2. Five permanent monitoring plots (1 m^2 quadrats) were established pre-treatment in early July 2024 where *Trapa* cover was > 50%. Plots will be monitored pre- and post-treatment 2025.
3. Additionally, stratified random point-intercept (1 m^2) plots along transects spaced one plot per 0.5 acres (approximately 45 meter on-center transect spacing) within treatment areas
    a. Transect/point-intercept spacing for plots area a function of size, vegetation coverage (patchy, entire area, littoral zone only), desired resolution of the data, and logistical constraints.
    a. Plots established in 2024 were delineated physically using 1 m^2 quadrats and all with spatial location (geographic coordinates, decimal degrees) recorded via Global Navigation Satellite Systems-enabled (GNSS) handheld units as latitude and longitude decimal degree coordinates in the center of each plot, new plots established 2025 will follow the same protocol.
3. Monitoring data metrics measured at each plot:
    a. Water depth (cm) measured at center of quadrat
    b. Aquatic plant species composition and abundance will be recorded and visually quantified as percent foliar cover the species occupies within the quadrat (range 0 – 100 for a total of 100% within the quadrat)
        i. At each sampling point, if water depths or water clarity are not conducive for visual evaluation, a vegetation rake will be used to validate visual estimates submersed vegetation
    c. *Trapa* rosette density (count of individual rosettes at the water's surface) within quadrat
    d. *Trapa* rosette diameter measured across the widest point (cm)
    e. Flowers and fruits observed enumerated from (n = 9) randomly selected rosettes within each quadrat

WATER QUALITY MONITORING METHODS
4. YSI Pro DSS data sondes will be used to collect water quality data immediately prior to treatment (within 1-hour) at designated monitoring plots, dissolved oxygen readings below optimal <3 – 5 ppm will result in postponement of treatment.
5. Water quality data will be collected during point-intercept surveys 6 and 12 WAT.
6. Metrics
    a. dissolved oxygen
    b. temperature
    c. pH
    d. conductivity
    e. Turbidity
7. Herbicide Dissipation Sampling
    a. Water samples will be collected at each treatment site and sent to an analytical

laboratory to determine aqueous herbicide concentrations post-treatment as specified by VA Herbicide Permit until herbicides are nondetectable in water samples.

   i. Each sample will consist of 30 ml water collected at 30 cm deep

b. A subset of predetermined sampling points will be randomly assigned within the treatment areas (n = 1 sampling point each treatment area), and one sampling point outside of each treatment area (n = 3)
c. Following collection, water samples will be appropriately preserved (acid fixed if necessary), stored on ice, frozen, and shipped overnight to the laboratory for analysis.

Appendix C

From:	Dodd, Lynde L ERDC-RDE-EL-TX CIV
To:	Chandler, Joseph W CIV USARMY CENAB (USA); May, Kristina K CIV USARMY CENAB (USA); Seiple, Jacqueline A CIV USARMY CENAB (USA)
Cc:	Dodd, Lynde L CIV USARMY CEERD-EL (USA); Hellinghausen, Kristina L CTR (USA)
Subject:	RE: Lake Brittle Herbicides
Date:	Monday, March 3, 2025 5:47:03 PM
Attachments:	FACTSHEET-CTRiverHydrilla-DemonstrationProject-May2023_updated.pdf FINAL_CTRHydrilla_Public-NoticeWCG.pdf

Hi y'all,

So great to get to see y'all and meet today.

I summarized a few actions items that Carrie mentioned in our meeting that I wanted to confirm for the EA.

1) make sure secondary impacts are included for each herbicide – we should have this, I will review to confirm
2) communication plan for use of herbicides – I've attached a factsheet that was used for the NAN CT River Herbicide Demonstration EA that can be modified for this project. And I'm assuming NAB will draft a public notice like the one attached (same NAN CT River Hydrilla Demonstration project)? Does VADWR need to provide a communication plan as well?
3) confirm if any dyes will be used - I'm confirming with applicator, but I didn't request dyes to be used. I've also asked that they provide to me the actual product that will be used.
4) ensure BMPs are clearly defined including treatment conditions (day of and days prior to treatment) – I'll check to make sure this was included, if not – I'll get it added
5) WQ monitoring plan is included – we should have this in appendix, I will review and add details if not clear
6) ensure both boat-applied and backpack sprayer application techniques are included – I am still waiting on the applicator to give me details on the equipment he will be using, but I know he will be using a boat and back-pack sprayer as required for each application.

Anything else I missed?

Thanks again!

Lynde Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
769-666-8777 | Lynde.L.Dodd@usace.army.mil

From: Traver, Carrie <Traver.Carrie@epa.gov>
Sent: Monday, March 3, 2025 3:13 PM
To: Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Cc: May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Seiple, Jacqueline A

CIV USARMY CENAB (USA) <Jacqueline.A.Seiple@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: [Non-DoD Source] RE: Lake Brittle Herbicides

Hi Joe et al:

Thank you for discussing the project. That approach would be consistent with what I have seen for other EAs that include herbicide treatments. Typically, the EA will include a table or short narrative that lists common trade names, similar to what you have outlined below, but will generally refer to/discuss the active ingredient (i.e. 'glyphosate') for the assessment of effects. However, if there is a significant difference among the formulations (for example, the carrier has different environmental effects or application requirements could not be met at the site) that would be worth exploring in the EA.

Have a good week!
Carrie

Carrie Traver
NEPA & Technical Assistance Branch
U.S. Environmental Protection Agency, Region 3
215-814-2772
traver.carrie@epa.gov

From: Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Sent: Monday, March 03, 2025 3:26 PM
To: Traver, Carrie <Traver.Carrie@epa.gov>
Cc: May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Seiple, Jacqueline A CIV USARMY CENAB (USA) <Jacqueline.A.Seiple@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: Lake Brittle Herbicides

Hi Carrie,
Thank you for meeting with us today. After our discussion, we had a few follow-up questions and were wondering if we could focus the Environmental Assessment (EA) specifically on the active ingredients in herbicide products, rather than concentrating on the various trade names. There are numerous trade names, and it's uncertain which ones will be readily available. Below is a list of the chemicals and potential trade names for your reference.

1. **florpyrauxifen-benzyl** (systemic herbicide, Mechanism of Action: Synthetic auxin; Trade name: ProCellaCOR SC)
2. **flumioxazin** (contact herbicide, Mechanism of Action: PPO inhibitor; Trade names: Clipper, Flumigard WDG, Flumigard SC, Semera SC, Propeller)
3. imazamox (systemic herbicide, Mechanism of Action: ALS inhibitor; Trade names: Clearcast, Imox, Imazacast, Top Deck, Castaway

Thanks
Joe Chandler
Biologist-Study Manager
Planning Division
Army Corps of Engineers-Baltimore District
Joseph.W.Chandler@usace.army.mil
Phone (443) 202-0772

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694

In Reply Refer To: 04/11/2025 14:30:38 UTC
Project Code: 2025-0031878
Project Name: Trapa bispinosa removal Lake Brittle

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

PROJECT SUMMARY

Project Code: 2025-0031878
Project Name: Trapa bispinosa removal Lake Brittle
Project Type: Invasive Plant Control
Project Description: Application of Imazamox, flumioxazin, florpyrauxifen-benzyl (split plot comparison) for water chestnut removal

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.75166015,-77.69408192014114,14z

Counties: Fauquier County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/

activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

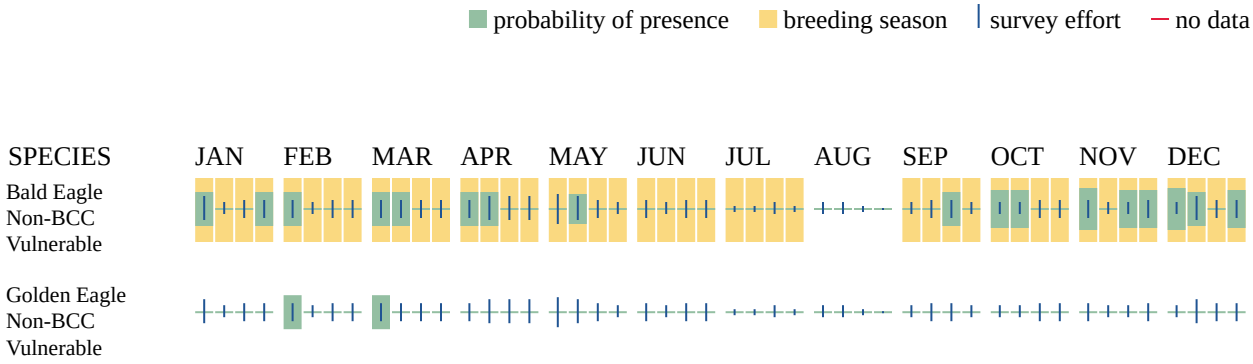
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere
Grasshopper Sparrow *Ammodramus savannarum perpallidus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Prairie Warbler *Setophaga discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31

NAME	BREEDING SEASON
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

■ probability of presence ■ breeding season | survey effort – no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Joseph Chandler
Address: 2 Hopkins Plaza
City: Baltimore
State: MD
Zip: 21201
Email joseph.w.chandler@usace.army.mil
Phone: 4109622809

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV
To: Gianino, David (VDACS); Leasure, Charles W CIV USARMY CENAB (USA); Pasternak, Anna (VDACS); Isel, Michael (DWR); Chandler, Joseph W CIV USARMY CENAB (USA); Odenkirk, John (DWR); May, Kristina K CIV USARMY CENAB (USA)
Cc: Hellinghausen, Kristina L CTR (USA); Dodd, Lynde L CIV USARMY CEERD-EL (USA)
Subject: RE: Brittle
Date: Tuesday, February 25, 2025 10:32:54 AM
Attachments: image001.png
image002.png
image003.png

All, I received the following information below from Dr. Heilman (Vice President - Environmental Restoration & Advocacy at SePRO).

"Our regulatory team confirms that ProcellaCOR SC and Clearcast had active registrations through 2024, and registration renewals for 2025 have been submitted and are being processed by VA. Our team indicates that the VA database will be updated once the processing is complete".

I have asked Dr. Heilman to forward an update when VA confirms registration for 2025.

Sounds like we're still on track – thanks everyone!

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Tuesday, February 25, 2025 8:17 AM
To: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: RE: Brittle

Thanks again, David!

Best,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
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www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Sent: Tuesday, February 25, 2025 8:15 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: RE: Brittle

I don't but I know there is a new portal tool that has reduced the time it takes to get products registered.

Unfortunately, since it's not in my program, I don't know how long it takes.

David Gianino
State Plant Regulatory Official (SPRO)
Program Manager, Office of Plant Industry Services
Virginia Department of Agriculture and Consumer Services

Phone: 804.786-3515
Website: www.vdacs.virginia.gov
E-mail: david.gianino@vdacs.virginia.gov
Address: 102 Governor Street, Richmond, Virginia 23219

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Tuesday, February 25, 2025 9:07 AM
To: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: RE: Brittle

Thank you for the clarification, David – we will work to get this completed ASAP. Would you know the typical turnaround from submission to approval?

And thanks again!

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Sent: Tuesday, February 25, 2025 7:45 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: RE: Brittle

Lynde and all,

If it's not registered for use, then the product must be registered through VDACS' Office of Pesticide Services.
Here's the webpage (https://www.vdacs.virginia.gov/pesticide-product-registration.shtml) and the contact email is opsclrt.vdacs@vdacs.virginia.gov.

David Gianino
State Plant Regulatory Official (SPRO)
Program Manager, Office of Plant Industry Services
Virginia Department of Agriculture and Consumer Services

Phone: 804.786-3515
Website: www.vdacs.virginia.gov
E-mail: david.gianino@vdacs.virginia.gov
Address: 102 Governor Street, Richmond, Virginia 23219

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Monday, February 24, 2025 8:13 PM

To: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Subject: RE: Brittle

Hi David,

Based upon Kristina's and Joe's review of the VA registered herbicides, it looks like only flumioxazin is registered in VA.

Does this mean that florpyrauxifen-benzyl and imazamox will need to be registered in VA? Will the manufacturer submit the registration or does the licensed applicator who wants to use that project register the product?

My apologies for the all the questions, we're just trying to navigate the process to ensure we can implement our demonstration for control of water chestnut this summer and get more information on the use of each of these products in VA.

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
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www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Sent: Monday, February 24, 2025 12:17 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Subject: RE: Brittle

Lynde,

I've highlighted the aquatic-use products of interest on the attached list. The only one listed among those three active ingredients was flumioxazin.

Please let me know if I can be of any further assistance.

Thank you,

Kristina Hellinghausen
Research Biologist
USACE ERDC EL EEA
Lewisville Aquatic Ecosystem Research Facility
201 E. Jones St. Lewisville, TX 75057
940-443-8066

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Thursday, February 20, 2025 10:44 AM
To: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Subject: RE: Brittle

Let's see if Kristina has better luck trying to find them in the attached file.

Kristina, can you comb through the attached excel file for us and locate and highlight the products/registration #s for the below herbicides and send back to us? I believe that the trade names are what you should be able to locate in the file.

1. **florpyrauxifen-benzyl** (systemic herbicide, Mechanism of Action: Synthetic auxin; Trade name: ProCellaCOR SC)
2. **flumioxazin** (contact herbicide, Mechanism of Action: PPO inhibitor; Trade names: Clipper, Flumigard WDG, Flumigard SC, Semera SC, Propeller)
3. **imazamox** (systemic herbicide, Mechanism of Action: ALS inhibitor; Trade names: Clearcast, Imox, Imazacast, Top Deck, Castaway)

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Thursday, February 20, 2025 8:33 AM
To: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>; Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: Re: Brittle

I'm fairly certain they've all been used in Virginia. ProcellaCOR has for sure.

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From: Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Sent: Thursday, February 20, 2025 9:29:11 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: RE: Brittle

Lynde,

We don't have any more information about the products than is available on the list of registered products that you were able to pull from the VDACS website.
If it's registered for use in Virginia, then it should be on that list.

What specific information are you looking for, beyond it's registration status?

David Gianino
State Plant Regulatory Official (SPRO)
Program Manager, Office of Plant Industry Services
Virginia Department of Agriculture and Consumer Services

Phone: 804.786-3515
Website: www.vdacs.virginia.gov
E-mail: david.gianino@vdacs.virginia.gov
Address: 102 Governor Street, Richmond, Virginia 23219

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Wednesday, February 19, 2025 7:44 PM
To: Pasternak, Anna (VDACS) <Anna.Pasternak@vdacs.virginia.gov>; Gianino, David (VDACS) <david.gianino@vdacs.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>

Subject: RE: Brittle

Good evening, Anna and David,

We're looking for more information on registration for the following aquatic-use herbicides in Virginia. I'm working with Baltimore District (Joe cc'd) on drafting an Environmental Assessment for managing Trapa in Lake Brittle (collaborating with VADWR) and need confirmation that the following are registered for use in Virginia. I've attached a product label for each of the herbicides below and the registered product list that Joe Chandler was able to download from the VDACS site. I believe that I found Clipper (flumioxazin) and that it is registered for use in VA.

1. **florpyrauxifen-benzyl** (systemic herbicide, Mechanism of Action: Synthetic auxin; Trade name: ProCellaCOR SC)
2. **flumioxazin** (contact herbicide, Mechanism of Action: PPO inhibitor; Trade names: Clipper, Flumigard WDG, Flumigard SC, Semera SC, Propeller)
3. **imazamox** (systemic herbicide, Mechanism of Action: ALS inhibitor; Trade names: Clearcast, Imox, Imazacast, Top Deck, Castaway)

Any help would be greatly appreciated.

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
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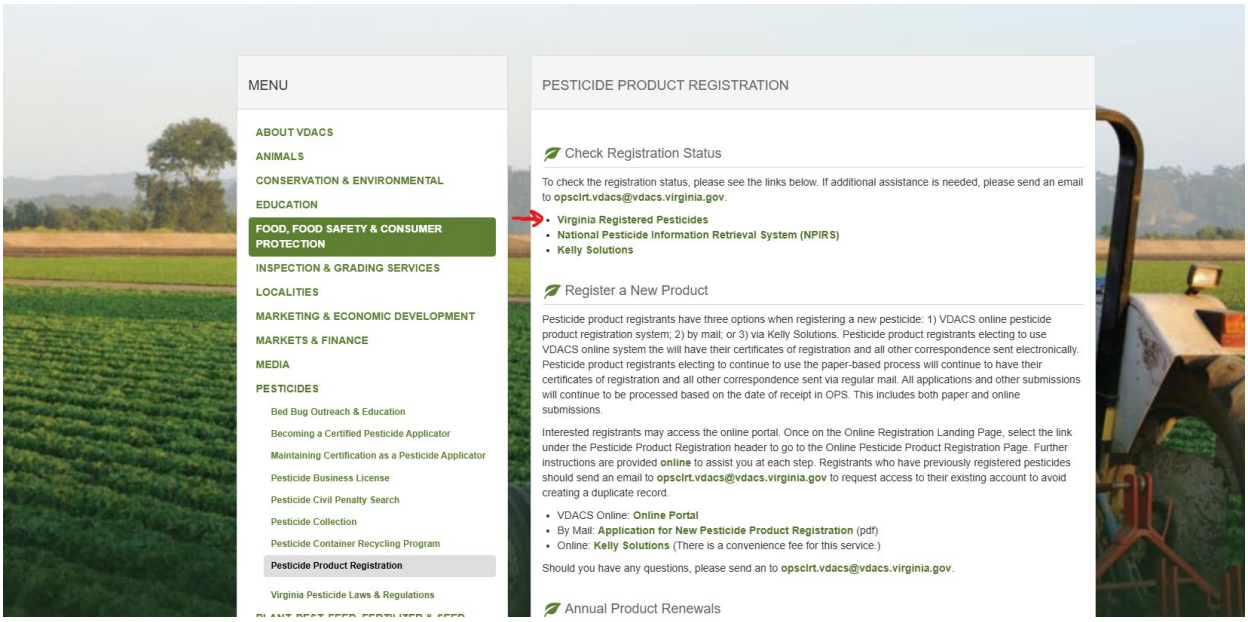
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Sent: Thursday, February 6, 2025 1:40 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; May, Kristina K CIV USARMY CENAB (USA) <Kristina.K.May@usace.army.mil>; Leasure, Charles W CIV USARMY CENAB (USA) <Charles.W.Leasure@usace.army.mil>
Subject: RE: Brittle

Hi John.
Here was the list. I just did a quick search in the file and did not see some of the products Lynde listed. Maybe I missed it. Let me know if there is anyone I should reach out to, so we can confirm if needed



Thanks
Joe Chandler
Biologist-Study Manager
Planning Division
Army Corps of Engineers-Baltimore District
Joseph.W.Chandler@usace.army.mil
Phone (443) 202-0772

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Thursday, February 6, 2025 2:24 PM
To: Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>; Dodd, Lynde L <lynde.l.dodd@erdc.dren.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: [Non-DoD Source] Re: Brittle

Joe - those 3 are pretty common except for ProCellaCOR which is new. We were going to use it at Brittle a couple years ago and were prepared to do so until our "free" sample went away. So, I'm not sure what list you saw at VDACS, but I would be shocked if these 3 were not allowed in VA. The first two have been used already I am certain.

From: Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Sent: Thursday, February 6, 2025 2:03 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L <lynde.l.dodd@erdc.dren.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

Hi John,
In addition, do we need to have the herbicides we are using registered within the state of Virginia? I found this list on the Virginia Department of AG and Consumer Services website (http://Blockedhttps://www.vdacs.virginia.gov/pesticides.shtmlBlocked). Some of the products Lynde listed were not found in the registered product list. Maybe this is because the list is focused on agricultural l pesticides, but wanted to make sure.

Thank you

Joe Chandler
Biologist-Study Manager
Planning Division
Army Corps of Engineers-Baltimore District
Joseph.W.Chandler@usace.army.mil
Phone (443) 202-0772

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Wednesday, February 5, 2025 7:32 PM
To: Dodd, Lynde L <lynde.l.dodd@erdc.dren.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>

Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: [Non-DoD Source] Re: Brittle

No. No permits needed. I'm a VDACS certified applicator and will endeavor to be on site when you're there.

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From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Wednesday, February 5, 2025 7:29:11 PM
To: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: RE: Brittle

Evening y'all - will we need specific VA permits to use the following aquatic use herbicides in Brittle? We plan to demonstrate foliar applications early summer targeting water chestnut June 2025, with spot treatments once monthly through September 2025 as needed. They will be evaluated separately, all at label rates plus aquatic use adjuvants (methylated seed oil).

1. **florpyrauxifen-benzyl** (systemic herbicide, Mechanism of Action: Synthetic auxin; Trade name: ProCellaCOR SC)
2. **flumioxazin** (contact herbicide, Mechanism of Action: PPO inhibitor; Trade names: Clipper, Flumigard WDG, Flumigard SC, Semera SC, Propeller)
3. **imazamox** (systemic herbicie, Mechanism of Action: ALS inhibitor; Trade names: Clearcast, Imox, Imazacast, Top Deck, Castaway)

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>
Sent: Monday, January 27, 2025 8:36 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: Re: Brittle

We haven't stocked any grass carp at Brittle since 2021, I would say there might be 2-3/ac in there. I believe we first documented Trapa at Brittle in summer of 2019.

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Monday, January 27, 2025 7:40 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: Re: Brittle

1. Is the water at Lake Brittle able to be lowered? Yes. We can pull boards, one at a time. Each board drops the lake about 6" over a few days. We don't prefer to do this during fishing/spawning season. Winter drawdowns are okay, but not after February. I recall that there is a spillway tower to control water levels, but as I understand is unable to be modified to lower water levels.
2. What are the concerns of using drawdown as an option to control water chestnut? See above. I'm assuming it is because it is not selective and can damage native vegetation and impact fisheries habitat. Yes, although a bit of control on the lotus would not be a bad thing.
3. What is the estimated rate for grass carp/acre in the lake? General recommendations, or in the lake now? The former is a moving target based on productivity and biomass. Anywhere from 1 to 12 per acre. If latter, I'd guess maybe a few per acre now. And the intent of the grass carp is to control hydrilla, correct? Yes. We currently have no information on the effectiveness of grass carp as biocontrol for water chestnut (no published literature). I hear they may be moderately effective if no SAV, but just anecdotal.
4. When was Trapa bispinosa first documented at Lake Brittle? Guessing 1998, but Mike copied with a better memory.

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Monday, January 27, 2025 6:30 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L CTR (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Chandler, Joseph W CIV USARMY CENAB (USA) <Joseph.W.Chandler@usace.army.mil>
Subject: RE: Brittle

Hi John, we have a few more questions for you regarding Lake Brittle as we navigate EA development with Baltimore District.

1. Is the water at Lake Brittle able to be lowered? I recall that there is a spillway tower to control water levels, but as I understand is unable to be modified to lower water levels.
2. What are the concerns of using drawdown as an option to control water chestnut? I'm assuming it is because it is not selective and can damage native vegetation and impact fisheries habitat.
3. What is the estimated rate for grass carp/acre in the lake? And the intent of the grass carp is to control hydrilla, correct? We currently have no information on the effectiveness of grass carp as biocontrol for water chestnut (no published literature).
4. When was Trapa bispinosa first documented at Lake Brittle?

Thank you,

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
www.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Tuesday, November 26, 2024 3:11 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: Fw: Brittle

Lynde - there should be no species of concern- greatest conservation need or otherwise- that would be impacted by proposed activities. Please proceed as planned. Thank you.
John.

From: Martin, Amy (DWR) <Amy.Martin@dwr.virginia.gov>
Sent: Tuesday, November 26, 2024 2:55 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Schul, Hannah (DWR) <Hannah.Schul@dwr.virginia.gov>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>; Owen, Tim (DWR) <Tim.Owen@dwr.virginia.gov>
Subject: RE: Brittle

I did a quick VAFWIS search, the results are attached. I've copied Tim Owen. If you have any questions, he should be able to assist as can Environmental Services.

Thanks, Amy

Amy Martin
(she/her/hers)
Manager, Nongame and Endangered Species Program
Cell: 804-481-5296
Virginia Department of Wildlife Resources
www.dwr.virginia.gov

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Tuesday, November 26, 2024 2:25 PM
To: Martin, Amy (DWR) <Amy.Martin@dwr.virginia.gov>; Schul, Hannah (DWR) <Hannah.Schul@dwr.virginia.gov>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: Re: Brittle

Thanks Amy. I'm not sure we need to sink a bunch of time into an EA review. What's most germane in this situation, I believe, is to verify we have no species of special conservation need that would be impacted by spraying herbicide on

invasive emergent aquatic vegetation in Lake Brittle. I'm pretty sure the answer is no since we've done this in the past. Trying to keep things easy.
OD

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From: Martin, Amy (DWR) <Amy.Martin@dwr.virginia.gov>
Sent: Tuesday, November 26, 2024 2:09:09 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: RE: Brittle

Hey John,
I forwarded this along to Hannah Schul assuming you were looking for review of the EA by her or her staff in Environmental Services. But, if you need me or staff in nongame to weigh in, let me know.

Amy

Amy Martin
(she/her/hers)
Manager, Nongame and Endangered Species Program
Cell: 804-481-5296
Virginia Department of Wildlife Resources
www.dwr.virginia.gov

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Tuesday, November 26, 2024 1:00 PM
To: Martin, Amy (DWR) <Amy.Martin@dwr.virginia.gov>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: Fw: Brittle

Hi Amy. This should have been a slam dunk with zero paperwork, but it got hung up in bureaucracy. So we will try again next year. I don't think we have any species of special concern that would be impacted by herbicide treatment of invasive aquatic plants in Lake Brittle but figured I'd better check. Thanks for your input.
John.

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Tuesday, November 26, 2024 12:50 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Nancy Rybicki <nanryb@gmail.com>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>; Ryan McIntyre <rmcinty@gmu.edu>
Subject: RE: Brittle

Hi John,

Hope all is well! I wanted to touch base with you on the APCRP field demo for Lake Brittle we pushed to next summer. I still intend on performing the herbicide field demonstration using foliar applications of flumioxazin, imazamox, and florpyrauxifen-benzyl at Lake Brittle in 2025 as part of a EDRR multi-agency approach to eradicate Trapa bispinosa in VA. Baltimore District will be conducting a NEPA EA for this work along with a couple sites in Fairfax County. This will include a 30-day public comment period for Lake Brittle and those other 2 sites in Fairfax County with NVSWCD. I've attached a recent EA/FONSI, and public notice flyer for other APCRP field demonstrations that were conducted on the Connecticut River for hydrilla management to give context on detail and the level of effort required for preparation of the environmental assessment.

Since the costs for this field demonstration have increased substantially due to the need for NEPA compliance with an EA/Finding of No Significant Impact (FONSI), I need confirmation from VDWR that Lake Brittle is still in need of Trapa management in 2025 and we're good to go for our collaboration (VDWR and USACE). To that end, would you be able to provide historical information on the flora/fauna of Lake Brittle for the EA, especially any state-listed species that may be in the area?

Have a great rest of the week and enjoy the holiday.

Best,
Lynde

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
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From: Ryan McIntyre <rmcinty@gmu.edu>
Sent: Friday, August 23, 2024 12:23 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Nancy Rybicki <nanryb@gmail.com>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: Re: Brittle

Sounds good.

John, is there any chance of being able to access the rental boats at Brittle?

Nancy, could I ask you to reach out to the Carrs to see if I can drop by and pick up the harvesting gear being stored at their place sometime this week?

I'll invite my new students to meet us there, and will bring a canoe and a kayak of my own.

I'm aiming to arrive at 8am to take preliminary data.

Ryan

Ryan McIntyre
He/Him/His
Research Fellow, US Army Corps of Engineers
Teaching Assistant, George Mason University Department of Environmental Science and Policy
President, Science Policy Network at Mason
rmcinty@gmu.edu
571-296-7655

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Friday, August 23, 2024 12:22 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Ryan McIntyre <rmcinty@gmu.edu>; Nancy Rybicki <nanryb@gmail.com>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: RE: Brittle

Sounds great John – we'll meet you there!

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
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From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Friday, August 23, 2024 10:56 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Ryan McIntyre <rmcinty@gmu.edu>; Nancy Rybicki <nanryb@gmail.com>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>
Subject: Re: Brittle

I'd say bring as many as you can. We will have at least 3 department people and a boat and canoe with some baskets. Plan to arrive 9ish.

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From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Friday, August 23, 2024 11:24 AM
To: Ryan McIntyre <rmcinty@gmu.edu>; Nancy Rybicki <nanryb@gmail.com>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

Ryan, if you could coordinate this that would be great. Please read down on the email thread for the plan I floated to DWR.

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
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From: Ryan McIntyre <rmcinty@gmu.edu>
Sent: Friday, August 23, 2024 8:10 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>; Nancy Rybicki <nanryb@gmail.com>
Cc: Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: Re: Brittle

Lab courses are off that week, so I'll be available all day.

What's the plan? I might be able to get some volunteers if I offer it to my students as an extra credit assignment.

Ryan

Ryan McIntyre
He/Him/His
Research Fellow, US Army Corps of Engineers
Teaching Assistant, George Mason University Department of Environmental Science and Policy
President, Science Policy Network at Mason
rmcinty@gmu.edu
571-296-7655

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Friday, August 23, 2024 8:48 AM
To: Nancy Rybicki <nanryb@gmail.com>
Cc: Ryan McIntyre <rmcinty@gmu.edu>; Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

Ryan, are you joining us that day?

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
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From: Nancy Rybicki <nanryb@gmail.com>
Sent: Thursday, August 22, 2024 8:53 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Ryan McIntyre <rmcinty@gmu.edu>; Hellinghausen, Kristina L OTH USARMY CEERD-EL (USA) <Kristina.L.Hellinghausen@usace.army.mil>; Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: Re: Brittle

I'm available for lake Brittle Sept 4, what's the plan that day?
Nancy

On Thu, Aug 22, 2024 at 7:18 PM Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil> wrote:

> Nancy and Ryan, were y'all able to join us on 9/4 at Lake Brittle?
>
> Lynde Lynne Dodd, CERP
> Research Biologist
> USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
> Aquatic Plant Ecology Team Lead
> RE: Lewisville Aquatic Ecosystem Research Facility
> 201 East Jones Street, Lewisville, Texas 75057
> 769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
> Blockedwww.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/Blocked
>
> ---
>
> **From:** Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
> **Sent:** Wednesday, August 21, 2024 2:25 PM
> **To:** Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
> **Subject:** Re: Brittle
>
> Does the 4th look good?
>
> ---
>
> **From:** Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
> **Sent:** Thursday, August 15, 2024 10:57 AM
> **To:** Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>; Ryan McIntyre <rmcinty@gmu.edu>
> **Cc:** Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Rybicki, Nancy <nrybicki@usgs.gov>
> **Subject:** RE: Brittle
>
> John,
>
> With the news that I can't move forward with treatments for Lake Brittle, I'm not sure what all I can do to contribute to managing Trapa in the lake. Trapa was starting to produce fruits when we were out on the lake early July and are probably loaded by now. However, any level of management employed at this time would reduce risk of dispersal by waterfowl or other means as well as reduce seed contributions for next year. We still have the 5 plots set up by Ryan that we can monitor again in September, which would provide data for next year or if there's means to hand remove only in those areas, we can use the data as a late-season physical removal site in our 2024 field demo research. Obviously, Ryan cannot hand harvest the entire lake, but with a few extra hands, removal could be accomplished in and around the plots to get some valuable data regarding physical removal of plants for Trapa bispinosa. As of now, our data set for physical removal is pointing toward ensuring all plant material is removed (like what was done at Pohick) to ensure success. It would be great to demonstrate this technique (complete removal).
>
> Let me know if this is something you would be interested in pursuing. I only have Ryan funded through 30-SEP. He does have other monitoring he needs to complete by then and get me data synthesis and analyses for a report (and his thesis), but with help, I bet he could fit it in. I'm coming up 9/4 to VA to visit management sites (management conducted by others that we are monitoring) and could focus the entire day on this with Ryan and Nancy, we would need access to kayaks and a few extra hands, if possible.
>
> Ryan, if John gives the go ahead, can you coordinate?
>
> Best,
> Lynde
>
> Lynde Lynne Dodd, CERP
> Research Biologist
> USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
> Aquatic Plant Ecology Team Lead
> RE: Lewisville Aquatic Ecosystem Research Facility
> 201 East Jones Street, Lewisville, Texas 75057
> 769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil

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From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Wednesday, July 10, 2024 3:34 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Ryan McIntyre <rmcinty@gmu.edu>; Rybicki, Nancy <nrybicki@usgs.gov>
Subject: Re: Brittle

Sounds great Lynde. Please proceed. Thanks.

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From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Wednesday, July 10, 2024 2:59:33 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Isel, Michael (DWR) <Mike.Isel@dwr.virginia.gov>; Willis, Robbie (DWR) <Robert.Willis@dwr.virginia.gov>; Reeser, Stephen (DWR) <Steve.Reeser@dwr.virginia.gov>; Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>; Ryan McIntyre <rmcinty@gmu.edu>; Rybicki, Nancy <nrybicki@usgs.gov>
Subject: RE: Brittle

Hi John,

Please see attached pre site assessment for information provided by Chris Fish concerning the coverage of Trapa on Lake Brittle. Adding to Chris' report, in the areas that I was able to access by walking in 1-ft to 2-ft of water along the shoreline, most of the Trapa was in rather shallow water and will most likely require several spot treatments beyond the initial treatment to catch everything. It looks like Chris will need to use the airboat to reach the shallows and navigate the colonies masked within the lotus.

I would like to evaluate the use of foliar imazamox + surfactant and foliar florpyrauxifen-benzyl (FPB) + surfactant targeting trapa for control. The west side of the lake will receive foliar treatments of imazamox and the east side, FPB. If you approve what I've outlined, I'll have Chris execute this plan when we are able to schedule the treatment. As of now we're looking at either 22-24JUL or 29-31-JUL so that I can be on-site for the first treatment. I'm waiting to hear back on which date works best for Chris. Ryan and I will assess the monitoring plots approx. 4WAT; we'll share those dates as soon as we schedule them and results thereafter.

Let me know if the plan works, and I will update you on scheduling.

Best,
Lynde

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
Blockedwww.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/Blocked

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From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Friday, June 28, 2024 2:20 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Subject: Re: Brittle

It does look like we should have access to at least one canoe and some kayaks.

Get Outlook for iOS

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Friday, June 28, 2024 2:21:49 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

I relayed the info that we would prefer that they not use an airboat.

Speaking of boats, don't suppose y'all will have one to go look at the extent as well. I need to install 5, 1-m monitoring plots in areas to receive treatment and I understood that most of the infestations is remote and requires a boat.

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
Blockedwww.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/Blocked

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From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Sent: Friday, June 28, 2024 12:47 PM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: Re: Brittle

Not loving the idea but as long as it's a short time window and we're there, okay.

Get Outlook for iOS

From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Friday, June 28, 2024 1:39 PM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

John,

The applicator wants to use an airboat on Monday, can that be used on Lake Brittle?

Lynde Lynne Dodd, CERP
Research Biologist
USACE | ERDC | EL | Aquatic Ecology and Invasive Species Branch
Aquatic Plant Ecology Team Lead
RE: Lewisville Aquatic Ecosystem Research Facility
201 East Jones Street, Lewisville, Texas 75057
769-666-8777 o/c | Lynde.L.Dodd@usace.army.mil
Blockedwww.erdc.usace.army.mil/Media/Fact-Sheets/Fact-Sheet-Article-View/Article/476784/lewisville-aquatic-ecosystem-research-facility-laerf/Blocked

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From: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Sent: Thursday, June 27, 2024 11:54 AM
To: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Cc: Dodd, Lynde L CIV USARMY CEERD-EL (USA) <Lynde.L.Dodd@usace.army.mil>
Subject: RE: Brittle

Hi John, 9am works great.

I'll be there a little earlier to scout locations for monitoring plots. The applicator plans to be there at 9 am and will have a boat. If site conditions allow, they want to conduct the treatment same day. I have not met this person, they're subcontracted and I'm only able to correspond with the contracting company.

My intern, Ryan McIntyre, and Nancy Rybicki will both be with me.

My cell is 769-666-8777.

Looking forward to seeing y'all Monday.

Best,

Lynde Dodd

CEERD-EL-EEA
769-666-8777
Lynde.L.Dodd@usace.army.mil

Sent by Blackberry Work.

From: Odenkirk, John (DWR) <John.Odenkirk@dwr.virginia.gov>
Date: Thursday, Jun 27, 2024 at 11:36 AM
To: Dodd, Lynde L ERDC-RDE-EL-TX CIV <Lynde.L.Dodd@erdc.dren.mil>
Subject: Brittle

What time? Thinking 9?

Get Outlook for iOS

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BALTIMORE DISTRICT
2 HOPKINS PLAZA
BALTIMORE, MD 21201

March 5, 2025

CENAB-PL-P

Julie Langan
State Historic Preservation Officer
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221

RE: Section 106 National Historic Preservation Act Consultation, Water Chestnut Removal, Lake Brittle, Fauquier County, Virginia

Dear Ms. Langan:

The purpose of this letter is to initiate consultation with your office in accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations at 36 Code of Federal Regulations Part 800, regarding the Water Chestnut Control Research and Demonstration Project. The U.S. Army Corps of Engineers, Baltimore District (USACE) is working with the USACE Environmental Research Design Center (ERDC) to remove the invasive water chestnut (*Trapa bispinosa var. iinumai*) at Lake Brittle, Fauquier County, Virginia (Enclosure 1). The project is authorized under the Aquatic Plant Control Research Program (APCRP) by Section 104 of the Rivers and Harbors Act of 1958, as amended. The APCRP provides an expanded aquatic plant control program that supports the prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from the navigable waters, tributary streams, connecting channels, and other allied waters of the United States (U.S.).

The purpose of the proposed project is to provide a field-scale demonstration of technology developed under the USACE APCRP, which evaluates the effectiveness of aquatic herbicides to manage a newly introduced species of water chestnut established in ponds, lakes, and rivers in Virginia and Maryland. This field demonstration will provide valuable information for developing future guidance on how to manage an invasive aquatic plant that is threatening critical freshwater systems across the U.S. It will also evaluate herbicide efficacy, optimal treatment timing, non-target impacts, and herbicide concentration-exposure time.

The project's area of potential effect (APE) may be defined as the areas of direct impacts and the areas within which the undertaking may directly or indirectly cause alterations to the character or use of historic properties, including visual effects. The APE for this project includes the locations of proposed herbicide treatment at Lake Brittle. The APE is within the National Register of Historic Places-eligible Buckland Mills Battlefield (#030-5152), which is a 10,375-acre resource associated with an 1863 American Civil War battle; however, herbicide application would have no effect on this resource's integrity. Additionally, only minimal ground disturbance from plant removal is anticipated as part of this project. The proposed project would have no effects on historic properties.

Thank you for assistance with this project. We ask that your office review the enclosed information and assist us in identifying and assessing the project's effect on historic properties. If you have any questions about the project, please contact Ethan A. Bean at: ethan.a.bean@usace.army.mil.

Sincerely,

Daniel M. Bierly, P.E.
Chief, Civil Project Development Branch
Planning Division

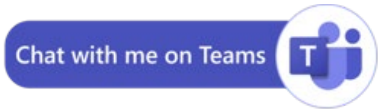
Enclosure

From: Bean, Ethan A CIV USARMY CENAB (USA)
To: May, Kristina K CIV USARMY CENAB (USA); Chandler, Joseph W CIV USARMY CENAB (USA)
Subject: FW: Water Chestnut Control Research and Demonstration Project (DHR File No. 2025-3403) | e-Mail #04620
Date: Monday, April 7, 2025 9:33:01 AM
Attachments: image001.png

FYI regarding the SHPO response to Trappa.

Ethan A. Bean, M.S.
Cultural Resources Specialist
History Program Manager
U.S. Army Corps of Engineers
Baltimore District

Work - Desk: (410) 962-2173
Work - Cell: (443) 742-8048



From: Jonathan Connolly <Jonathan.Connolly@dhr.virginia.gov>
Sent: Friday, April 4, 2025 3:14 PM
To: Bean, Ethan A CIV USARMY CENAB (USA) <ETHAN.A.BEAN@usace.army.mil>
Subject: [Non-DoD Source] Water Chestnut Control Research and Demonstration Project (DHR File No. 2025-3403) | e-Mail #04620

Dear Mr. Bean,

Thank you for requesting comments from the Department of Historic Resources (DHR) on the referenced project. Based upon the documentation provided, it is our opinion that the historic properties within the Area of Potential Effects will not be adversely affected by the proposed undertaking.

Implementation of the undertaking in accordance with the finding of *No Adverse Effect* as documented fulfills the Federal agency's responsibilities under Section 106 of the National Historic Preservation Act. If the scope of the undertaking changes or if the undertaking cannot be completed as proposed in the application submitted and reviewed by DHR, please contact our office for guidance on reinitiating consultation under Section 106.

If you have any questions or require any further assistance, please contact me.

Sincerely,

Jonathan Connolly, Archaeologist
Department of Historic Resources
Review and Compliance Division
Phone: (804) 482-8089
Jonathan.Connolly@dhr.virginia.gov

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BALTIMORE DISTRICT
2 HOPKINS PLAZA
BALTIMORE, MD 21201

March 5, 2025

CENAB-PL-P

Martina Thomas
Interim Tribal Historic Preservation Officer
Delaware Tribe of Indians
5100 Tuxedo Blvd.
Bartlesville, OK 64006

RE: Section 106 National Historic Preservation Act Consultation, Water Chestnut Removal, Lake Brittle, Fauquier County, Virginia

Dear Ms. Thomas:

The purpose of this letter is to initiate consultation with your office in accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations at 36 Code of Federal Regulations Part 800, regarding the Water Chestnut Control Research and Demonstration Project. The U.S. Army Corps of Engineers, Baltimore District (USACE) is working with the USACE Environmental Research Design Center (ERDC) to remove the invasive water chestnut (*Trapa bispinosa var. iinumai*) at Lake Brittle, Fauquier County, Virginia (Enclosure 1). The project is authorized under the Aquatic Plant Control Research Program (APCRP) by Section 104 of the Rivers and Harbors Act of 1958, as amended. The APCRP provides an expanded aquatic plant control program that supports the prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from the navigable waters, tributary streams, connecting channels, and other allied waters of the United States (U.S.).

The purpose of the proposed project is to provide a field-scale demonstration of technology developed under the USACE APCRP, which evaluates the effectiveness of aquatic herbicides to manage a newly introduced species of water chestnut established in ponds, lakes, and rivers in Virginia and Maryland. This field demonstration will provide valuable information for developing future guidance on how to manage an invasive aquatic plant that is threatening critical freshwater systems across the U.S. It will also evaluate herbicide efficacy, optimal treatment timing, non-target impacts, and herbicide concentration-exposure time.

The project's area of potential effect (APE) may be defined as the areas of direct impacts and the areas within which the undertaking may directly or indirectly cause alterations to the character or use of historic properties, including visual effects. The APE for this project includes the locations of proposed herbicide treatment at Lake Brittle. The APE is within the National Register of Historic Places-eligible Buckland Mills Battlefield (#030-5152), which is a 10,375-acre resource associated with an 1863 American Civil War battle; however, herbicide application would have no effect on this resource's integrity. Additionally, only minimal ground disturbance from plant removal is anticipated as part of this project. The proposed project would have no effects on historic properties.

Please let us know if you are interested in consulting on this project on a Government-to-Government basis, and the extent to which you wish to participate. We will provide a USACE representative at any consultation meetings, and we will fully consider any information you wish to provide.

Thank you for assistance with this project. We ask that your office review the enclosed information and assist us in identifying and assessing the project's effect on historic properties. If you have any questions about the project, please contact Ethan A. Bean at: ethan.a.bean@usace.army.mil.

Sincerely,

Daniel M. Bierly, P.E.
Chief, Civil Project Development Branch
Planning Division

Enclosure

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BALTIMORE DISTRICT
2 HOPKINS PLAZA
BALTIMORE, MD 21201

March 5, 2025

CENAB-PL-P

Katelyn Lucas
Tribal Historic Preservation Officer
Delaware Nation
P.O. Box 825
Anadarko, OK 73005

RE: Section 106 National Historic Preservation Act Consultation, Water Chestnut Removal, Lake Brittle, Fauquier County, Virginia

Dear Ms. Lucas:

The purpose of this letter is to initiate consultation with your office in accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations at 36 Code of Federal Regulations Part 800, regarding the Water Chestnut Control Research and Demonstration Project. The U.S. Army Corps of Engineers, Baltimore District (USACE) is working with the USACE Environmental Research Design Center (ERDC) to remove the invasive water chestnut (*Trapa bispinosa var. iinumai*) at Lake Brittle, Fauquier County, Virginia (Enclosure 1). The project is authorized under the Aquatic Plant Control Research Program (APCRP) by Section 104 of the Rivers and Harbors Act of 1958, as amended. The APCRP provides an expanded aquatic plant control program that supports the prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from the navigable waters, tributary streams, connecting channels, and other allied waters of the United States (U.S.).

The purpose of the proposed project is to provide a field-scale demonstration of technology developed under the USACE APCRP, which evaluates the effectiveness of aquatic herbicides to manage a newly introduced species of water chestnut established in ponds, lakes, and rivers in Virginia and Maryland. This field demonstration will provide valuable information for developing future guidance on how to manage an invasive aquatic plant that is threatening critical freshwater systems across the U.S. It will also evaluate herbicide efficacy, optimal treatment timing, non-target impacts, and herbicide concentration-exposure time.

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Please let us know if you are interested in consulting on this project on a Government-to-Government basis, and the extent to which you wish to participate. We will provide a USACE representative at any consultation meetings, and we will fully consider any information you wish to provide.

Thank you for assistance with this project. We ask that your office review the enclosed information and assist us in identifying and assessing the project's effect on historic properties. If you have any questions about the project, please contact Ethan A. Bean at: ethan.a.bean@usace.army.mil.

Sincerely,

Daniel M. Bierly, P.E.
Chief, Civil Project Development Branch
Planning Division

Enclosure

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BALTIMORE DISTRICT
2 HOPKINS PLAZA
BALTIMORE, MD 21201

March 5, 2025

CENAB-PL-P

Wendy Wheatcraft
Preservation Planner
Fauquier County Department of Historic Preservation
16 Courthouse Square
Warrenton, VA 20186

RE: Section 106 National Historic Preservation Act Consultation, Water Chestnut Removal, Lake Brittle, Fauquier County, Virginia

Dear Ms. Wheatcraft:

The purpose of this letter is to initiate consultation with your office in accordance with Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations at 36 Code of Federal Regulations Part 800, regarding the Water Chestnut Control Research and Demonstration Project. The U.S. Army Corps of Engineers, Baltimore District (USACE) is working with the USACE Environmental Research Design Center (ERDC) to remove the invasive water chestnut (*Trapa bispinosa var. iinumai*) at Lake Brittle, Fauquier County, Virginia (Enclosure 1). The project is authorized under the Aquatic Plant Control Research Program (APCRP) by Section 104 of the Rivers and Harbors Act of 1958, as amended. The APCRP provides an expanded aquatic plant control program that supports the prevention, control, and progressive eradication of noxious aquatic plant growths and aquatic invasive species from the navigable waters, tributary streams, connecting channels, and other allied waters of the United States (U.S.).

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The project's area of potential effect (APE) may be defined as the areas of direct impacts and the areas within which the undertaking may directly or indirectly cause alterations to the character or use of historic properties, including visual effects. The APE for this project includes the locations of proposed herbicide treatment at Lake Brittle. The APE is within the National Register of Historic Places-eligible Buckland Mills Battlefield (#030-5152), which is a 10,375-acre resource associated with an 1863 American Civil War battle; however, herbicide application would have no effect on this resource's integrity. Additionally, only minimal ground disturbance from plant removal is anticipated as part of this project. The proposed project would have no effects on historic properties.

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Sincerely,

Daniel M. Bierly, P.E.
Chief, Civil Project Development Branch
Planning Division

Enclosure

Appendix D

SAFETY DATA SHEET

EMERGENCY CALL: 1-800-424-9300 (CHEMTREC)

1. IDENTIFICATION

PRODUCT NAME: Alligare FLUMIGARD™ Herbicide
DESCRIPTION: A granular herbicide
EPA Reg. No.: 81927-68

COMPANY IDENTIFICATION:
Alligare, LLC
1565 5th Avenue
Opelika, AL 36801

2. HAZARD IDENTIFICATION

WARNING

Harmful if inhaled (H332)
May be harmful in contact with skin (H313)
Causes eye irritation (H320)
Suspected of damaging fertility or the unborn child (H361)
Very toxic to aquatic life with long lasting effects (H410)

HAZARD CLASSIFICATION

Health Hazards	Category	Physical Hazards	Category
Acute Toxicity – Inhalation	4	None	-
Acute Toxicity – Dermal	5		
Eye Damage / Irritation	2B	**Environmental Hazards**	**Category**
Reproductive Toxicity	2	Hazardous to the Aquatic Environment – Acute	1
		Hazardous to the Aquatic Environment – Chronic	1

HAZARDS NOT REQUIRING CLASSIFICATION

None

PRECAUTIONARY STATEMENTS

Avoid breathing dust. Use only outdoors or in a well-ventilated area. (P261+P271)

Wash hands thoroughly after handling. (P264)

Avoid release to the environment in a manner not in accordance with the product label. (P273)

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. (P305+P351+P338+P337+P313)

IF INHALED: Remove person to fresh are and keep comfortable for breathing. Call a poison control center or doctor if you feel unwell. (P304+P340+P312)

IF ON SKIN: Call a poison control center or doctor if you feel unwell. (P302+P312)

Collect spillage. (P391)

Dispose of contents / container in accordance with local regulations. Refer to the product label for specific disposal instructions. (P501)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Common Name	Chemical Name	CAS #	Composition
Flumioxazin	(2-[7-flouro-3,4-dihydro-3-oxo-4-(2-propynyl)-2H-1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1H-isoindole-1,3(2H)-dione)	103361-09-7	51.0%

4. FIRST AID MEASURES

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-424-9300 for emergency medical treatment information.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15 to 20 minutes. Call a poison control center or doctor for treatment advice.

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

5. FIREFIGHTING MEASURES

Flash Point: No data available

Flammability Limits: Not determined

Fire and Explosion Hazards: May thermally decompose in fire releasing irritating and toxic gases.

Means of Extinction: Use water fog or fine spray, CO_2, foam or dry chemical.

Fire Fighting Instructions: Does not burn, fight surrounding fire as appropriate. Evacuate area and fight fire upwind from a safe distance to avoid possible hazardous fumes and decomposition products. Dike runoff and do not allow runoff to enter sewers, storm drains or waterways. Foam and dry chemical extinguishing systems are preferred to prevent environmental damage from excessive water runoff. Decontaminate PPE and firefighting equipment before reuse.

Firefighting Equipment: Self-contained breathing apparatus with full face piece and full bunker gear.

Hazardous Combustion Products: Nitrogen and fluorine compounds may result.

NFPA Ratings: Health: 1 / Flammability: 1 / Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

Clean up spills immediately observing the precautions in Section 8 of this SDS. Isolate the hazard area and keep unnecessary and unprotected personnel from entering. Keep upwind of spill and ventilate area if possible. Prevent material from contaminating soil or from entering sewage and drainage systems and bodies of water.

Spills: Reduce airborne dust and vacuum or sweep up material and place in a chemical waste container. Wash spill area with soap and water, and pick up wash liquid with absorbent material and place in a chemical waste container.

7. HANDLING AND STORAGE

Handling: Avoid breathing dust and spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

Storage: Keep pesticide in original container. Store in a cool, dry, secure place. Do not put formulation or dilute spray solution into food or drink containers. Do not store or transport near feed or food. Not for use or storage in or around the home. Do not contaminate water, food or feed by storage, disposal or cleaning equipment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash station and a safety shower.

Protective Clothing: Applicators and other handlers must wear: long-sleeved shirt and long pants, socks, shoes and waterproof gloves.

General: Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light brown granules
Odor:	Slight
Melting / Freezing point:	no data available
Boiling Point / Boiling Range:	no data available
Flammability:	not flammable
Flammability Limits:	no data available
Flash Point:	no data available
Auto-ignition Temperature:	no data available
Decomposition Temperature:	no data available
pH:	6-7
Kinematic Viscosity:	no data available
Solubility:	Dispersible
Partition coefficient:	no data available
Vapor Pressure:	no data available
Specific Gravity:	no data available
Bulk Density:	0.6 g/cm^3 (37 lbs/ft^3)

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Temperature extremes and direct sunlight.

CHEMICAL STABILITY: Stable under normal use and transportation situations.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

INCOMPATIBILITY WITH OTHER MATERIALS: Strong oxidizing agents.

HAZARDOUS REACTIONS: None known.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

The following information is for the technical material or a similar formulation:

ORAL TOXICITY (rat LD_{50}): > 5,000 mg/kg

DERMAL TOXICITY (rat LD_{50}): > 2,000 mg/kg

INHALATION TOXICITY (rat LC_{50}): > 2.18 mg/L (4-hour)

EYE IRRITATION: Brief and/or minor irritation

SKIN IRRITATION: Brief and/or minor irritation

SKIN SENSITIZATION: Not a sensitizer

CARCINOGENICITY:

IARC: Not listed US NTP: Not listed ACGIH: Not listed

MUTAGENIC TOXICITY: No evidence of mutagenic effects during *in vivo* or *in vitro* studies.

REPRODUCTIVE TOXICITY: Reproductive toxicity was observed in F1 males, P1 females and F1 females at 300 ppm flumioxazin technical, the highest dose tested and a dose that also produced signs of systemic toxicity. Toxicity was also observed in the F1 and F2 offspring at doses of 200 ppm and greater.

DEVELOPMENTAL TOXICITY: Flumioxazin Technical produces developmental toxicity in rats in the absence of maternal toxicity at doses of 30 mg/kg/day by the oral route and 300 mg/kg/day by the dermal route. The developmental effects noted consisted primarily of decreased number of live fetuses and fetal weights, cardiovascular abnormalities, wavy ribs and decreased number of ossified sacrococcygeal vertebral bodies. The developmental NOEL in the rat oral and dermal developmental toxicity studies were 10 and 100 mg/kg/day, respectively. The response in rabbits was very different from that in rats. No developmental toxicity was noted in rabbits at doses up to 3000 mg/kg/day, a dose well above the maternal NOEL of 1000 mg/kg/day.

Mechanistic studies indicate that the effects seen in the rat are highly unlikely to occur in the human and that flumioxazin would not be a developmental toxicant in the human.

12. ECOLOGICAL INFORMATION

This product is toxic to non-target plants and aquatic invertebrates. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to non-target plants and aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwaters or rinsate. Refer to the product label for additional information.

The following is for the active ingredient, Flumioxazin:

Rainbow trout (96-hr LC_{50}):	2.3 mg/L	Bobwhite Quail (Dietary LC_{50}):	> 5,620 ppm
Sheepshead minnow (96-hr LC_{50}):	> 4.7 mg/L	Bobwhite Quail (48-hr oral LD_{50}):	> 2,250 ppm
Daphnia magna (48-hr LC_{50}):	> 5.5 mg/L	Bees (acute contact):	> 105 µg/bee
Mysid shrimp (96-hr LC_{50}):	0.23 mg/L		

Rainbow trout (NOEC):	> 7.7 µg/L, < 16 µg/L
Mysid shrimp (NOEC):	> 15 µg/L, < 27 µg/L
Daphnia magna (NOEC):	> 52 µg/L, < 99 µg/L

13. DISPOSAL CONSIDERATIONS

Do not contaminate water, food or feed by disposal.

PESTICIDE DISPOSAL: Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse or refill this container. Refer to the product label for specific container handling instructions.

14. TRANSPORT INFORMATION

UN Number:	UN3077
Proper Shipping Name:	Environmentally hazardous substance, solid, N.O.S. (contains Flumioxazin)
Transport Hazard Class:	9
Packing Group:	III
Hazard Zone:	A
Marine Pollutant:	Yes[1]
Hazardous Substance RQ:	None
Labels / Placards:	US-DOT: Class 9 Environmentally Hazardous Substance[2] IMDG, IATA: Class 9 Environmentally Hazardous Substance[3]
Emergency Guide:	171 (NAERG – North American Emergency Response Guide)
[1] **Marine Pollutant Note:**	Ground-only shipments are excluded from Marine Pollutant labeling requirements as per 49CFR§172.101 Appendix B(4). For any shipments involving all or part of the transport by vessel, the shipment must be classified as a Marine Pollutant unless a limited quantity exemption applies (see note 3 below).
[2] **US-DOT Note:**	Not regulated for “ground only” shipments.
[3] **IMDG / IATA Note:**	Not regulated when shipped in single or inner packaging ≤ 11 lbs. (5 kg) in strong outer packaging.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

FIFRA –

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. The following is the hazard information as required on the pesticide label:

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION. Harmful if inhaled or absorbed through the skin. Causes moderate eye irritation. Avoid breathing dust and spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse. Wear long-sleeved shirt and long pants, socks, shoes and waterproof gloves.

See inside label booklet for additional Precautionary Statements and Directions for Use including Storage and Disposal instructions.

ENVIRONMENTAL HAZARDS

This product is toxic to non-target plants and aquatic invertebrates. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to non-target plants and aquatic organisms in neighboring areas. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from treated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This pesticide is toxic to plants and should be used strictly in accordance with the drift and run-off precautions on this label in order to minimize off-site exposures.

Under some conditions this product may have a potential to run off to surface water or adjacent land. Where possible, use methods which reduce soil erosion, including no-till, limited till and contour plowing; these methods also reduce pesticide run-off. Use of vegetation filter strips along rivers, creeks, streams, wetlands or on the downhill side of fields where run-off could occur will minimize water run-off and is recommended.

All pesticides are governed under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The regulatory information presented below is pertinent only when this product is handled outside of the normal use and application as a pesticide. This product is excluded from listing requirements under EPA/TSCA.

SARA Title III – Section 302 Extremely Hazardous Substances
Not listed

SARA Title III – Section 311/312 Hazard Categories
Immediate

SARA Title III – Section 312 Threshold Planning Quantity
N/A

SARA Title III – Section 313 Reportable Ingredients
None

CERCLA –
Not listed

CALIFORNIA PROP 65 –
This product does not contain any chemicals known to the State of California to cause cancer or reproductive harm.

CANADA –
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

16. OTHER INFORMATION

THIS INFORMATION IN THIS SDS IS BASED ON DATA AVAILABLE AS OF THE REVISION DATE GIVEN HEREIN, AND BELIEVED TO BE CORRECT. CONTACT ALLIGARE, LLC TO CONFIRM IF YOU HAVE THE MOST CURRENT MSDS. JUDGMENTS AS TO THE SUITABILITY OF THE INFORMATION HEREIN FOR THE INDIVIDUAL'S OWN USE OR PURPOSES IS NECESSARILY THE INDIVIDUAL'S OWN RESPONSIBILITY. ALTHOUGH REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF SUCH INFORMATION, ALLIGARE, LLC EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS, AND ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY OR SUITABILITY OF SUCH INFORMATION FOR APPLICATION TO THE INDIVIDUAL'S PURPOSES OR THE CONSEQUENCES OF ITS USE.

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

SDS Version: 2.0 Effective Date: 03/28/2023

We create chemistry

Safety Data Sheet
Clearcast Herbicide

1. Identification

Product identifier used on the label

Clearcast Herbicide

Recommended use of the chemical and restriction on use

Recommended use*: crop protection product, herbicide

* The “Recommended use” identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

24 Hour Emergency Response Information
CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification

Substance number:	136003
Registration number:	EPA Registration number: 241-437
Molecular formula:	C15 H18 N3 O4 . N H(4)
Synonyms:	ammonium salt of imazamox

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

Repr.	2 (unborn child)	Reproductive toxicity
Aquatic Acute	1	Hazardous to the aquatic environment - acute
Aquatic Chronic	1	Hazardous to the aquatic environment - chronic

Label elements

Pictogram:

Signal Word:
Warning

Hazard Statement:

H361	Suspected of damaging the unborn child.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.

Precautionary Statements (Prevention):

P273	Avoid release to the environment.
P280	Wear protective gloves, protective clothing and eye protection or face protection.
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.

Precautionary Statements (Response):

P391	Collect spillage.
P308 + P313	IF exposed or concerned: Get medical attention.

Precautionary Statements (Storage):

P405	Store locked up.

Precautionary Statements (Disposal):

P501	Dispose of contents/container in accordance with local regulations.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

ammonium salt of imazamox (active ingredient)
CAS Number: 247057-22-3
Content (W/W): 12.1 %
Synonym: No data available.

Imazamox
CAS Number: 114311-32-9
Content (W/W): >= 10.0 - < 15.0%
Synonym: No data available.

Ammonium hydroxide
CAS Number: 1336-21-6
Content (W/W): >= 0.2 - < 1.0%
Synonym: Ammonium hydroxide; Aqeous ammonia

Acetic acid

CAS Number: 64-19-7
Content (W/W): > 0.0 - < 0.2%
Synonym: Acetic acid; Glacial acetic acid

4. First-Aid Measures

Description of first aid measures

General advice:
First aid providers should wear personal protective equipment to prevent exposure. Remove contaminated clothing. Move person to fresh air. If person is not breathing, call 911 or ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. In case of intoxication, call a poison control center or physician for treatment advice, taking the packaging or the label of the product.

If inhaled:
Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary.

If on skin:
Rinse skin immediately with plenty of water for 15 - 20 minutes.

If in eyes:
Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing.

If swallowed:
Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions.

Most important symptoms and effects, both acute and delayed

Symptoms: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11., (Further) symptoms and / or effects are not known so far
Hazards: Information, i.e. additional information on symptoms and effects may be included in the GHS labeling phrases available in Section 2 and in the Toxicological assessments available in Section 11. (Further) symptoms and / or effects are not known so far

Indication of any immediate medical attention and special treatment needed

Note to physician

Treatment:	Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
foam, dry powder, carbon dioxide, water spray

Special hazards arising from the substance or mixture
Hazards during fire-fighting:
carbon monoxide, carbon dioxide, nitrogen oxides, sulfur oxides
If product is heated above decomposition temperature, toxic vapours will be released. The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters
Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
Evacuate area of all unnecessary personnel. Contain contaminated water/firefighting water. Do not allow to enter drains or waterways.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Take appropriate protective measures. Clear area. Shut off source of leak only under safe conditions. Extinguish sources of ignition nearby and downwind. Ensure adequate ventilation. Wear suitable personal protective clothing and equipment.

Environmental precautions
Do not discharge into the subsoil/soil. Do not discharge into drains/surface waters/groundwater. Contain contaminated water/firefighting water.

Methods and material for containment and cleaning up
Dike spillage. Pick up with suitable absorbent material. Place into suitable containers for reuse or disposal in a licensed facility. Spilled substance/product should be recovered and applied according to label rates whenever possible. If application of spilled substance/product is not possible, then spills should be contained, solidified, and placed in suitable containers for disposal. After decontamination, spill area can be washed with water. Collect wash water for approved disposal.

7. Handling and Storage

Precautions for safe handling
RECOMMENDATIONS ARE FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS. PESTICIDE APPLICATORS & WORKERS must refer to the Product Label and Directions for Use attached to the product for Agricultural Use Requirements in accordance with the EPA Worker Protection Standard 40 CFR part 170. Ensure adequate ventilation. Provide good ventilation of working area (local exhaust ventilation if necessary). Keep away from sources of ignition - No smoking. Keep container tightly sealed. Protect contents from the effects of light. Protect against heat. Protect from air. Handle and open container with care. Do not open until ready to use. Once container is opened, content should be used as soon as possible. Avoid aerosol formation. Avoid dust formation. Provide means for controlling leaks and spills. Do not return residues to the storage containers. Follow label warnings even after container is emptied. The substance/ product may be handled only by appropriately trained personnel. Avoid all direct contact with the substance/product. Avoid contact with the skin, eyes and clothing. Avoid inhalation of dusts/mists/vapours. Wear suitable personal protective clothing and equipment.

Protection against fire and explosion:

The relevant fire protection measures should be noted. Fire extinguishers should be kept handy. Avoid all sources of ignition: heat, sparks, open flame. Sources of ignition should be kept well clear. Avoid extreme heat. Keep away from oxidizable substances. Electrical equipment should conform to national electric code. Ground all transfer equipment properly to prevent electrostatic discharge. Electrostatic discharge may cause ignition.

Conditions for safe storage, including any incompatibilities

Segregate from incompatible substances. Segregate from foods and animal feeds. Segregate from textiles and similar materials.

Further information on storage conditions: Keep only in the original container in a cool, dry, well-ventilated place away from ignition sources, heat or flame. Protect containers from physical damage. Protect against contamination. The authority permits and storage regulations must be observed.

Storage stability:
If substance/product crystallizes, thaw at room temperature.
Protect from temperatures below: 0 °C
Changes in the properties of the product may occur if substance/product is stored below indicated temperature for extended periods of time.
Protect from temperatures above: 40 °C
Changes in the properties of the product may occur if substance/product is stored above indicated temperature for extended periods of time.

8. Exposure Controls/Personal Protection

Users of a pesticidal product should refer to the product label for personal protective equipment requirements.

No substance specific occupational exposure limits known.

Advice on system design:
Whenever possible, engineering controls should be used to minimize the need for personal protective equipment.

Personal protective equipment
RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:

Respiratory protection:
Wear respiratory protection if ventilation is inadequate. Wear a NIOSH-certified (or equivalent) TC23C Chemical/Mechanical type filter system to remove a combination of particles, gas and vapours. For situations where the airborne concentrations may exceed the level for which an air purifying respirator is effective, or where the levels are unknown or Immediately Dangerous to Life or Health (IDLH), use NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

Hand protection:
Chemical resistant protective gloves, Protective glove selection must be based on the user's assessment of the workplace hazards.

Eye protection:
Safety glasses with side-shields. Tightly fitting safety goggles (chemical goggles). Wear face shield if splashing hazard exists.

Body protection:
Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

General safety and hygiene measures:
Wear long sleeved work shirt and long work pants in addition to other stated personal protective equipment. Work place should be equipped with a shower and an eye wash. Handle in accordance with good industrial hygiene and safety practice. Personal protective equipment should be decontaminated prior to reuse. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Store work clothing separately. Hands and/or face should be washed before breaks and at the end of the shift. No eating, drinking, smoking or tobacco use at the place of work. Keep away from food, drink and animal feeding stuffs.

9. Physical and Chemical Properties

Form:	liquid
Odour:	acidic, mild
Odour threshold:	Not determined due to potential health hazard by inhalation.
Colour:	pale yellow, clear
pH value:	approx. 5 - 7 (20 °C)
Freezing point:	approx. 0 °C (1,013.3 hPa) Information applies to the solvent.
Boiling point:	approx. 100 °C (1,013.3 hPa) Information applies to the solvent.
Flash point:	A flash point determination is unnecessary due to the high water content.
Flammability:	not applicable
Lower explosion limit:	As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Upper explosion limit:	As a result of our experience with this product and our knowledge of its composition we do not expect any hazard as long as the product is used appropriately and in accordance with the intended use.
Autoignition:	Based on the water content the product does not ignite.
Vapour pressure:	approx. 23.3 hPa (20 °C) Information applies to the solvent.
Density:	1.0486 g/cm3 (20 °C) 8.7510 Lb/USg (68 °F)
Vapour density:	not applicable

Partitioning coefficient n-octanol/water (log Pow):	not applicable
Thermal decomposition:	Not a substance liable to self-decomposition according to UN transport regulations, class 4.1.
Viscosity, dynamic:	3.7 mPa.s (20 °C)
Solubility in water:	soluble
Evaporation rate:	not applicable
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.

10. Stability and Reactivity

Reactivity
No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:
Corrosive effects to metal are not anticipated.

Oxidizing properties:
Not an oxidizer.

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
The product is chemically stable.
No hazardous reactions if stored and handled as prescribed/indicated.

Conditions to avoid
Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static charge. Avoid prolonged storage. Avoid contamination. Avoid prolonged exposure to extreme heat. Avoid extreme temperatures.

Incompatible materials
oxidizing agents

Hazardous decomposition products

Decomposition products:
Hazardous decomposition products: No hazardous decomposition products if stored and handled as prescribed/indicated.

Thermal decomposition:
Not a substance liable to self-decomposition according to UN transport regulations, class 4.1.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Relatively nontoxic after single ingestion. Slightly toxic after short-term skin contact. Relatively nontoxic after short-term inhalation.

Oral
Type of value: LD50
Species: rat
Value: > 5,000 mg/kg

Inhalation
Type of value: LC50
Species: rat
Value: > 5 mg/l
Exposure time: 4 h
No mortality was observed.

Dermal
Type of value: LD50
Species: rat
Value: > 4,000 mg/kg
No mortality was observed.

Assessment other acute effects
Assessment of STOT single:
Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

The product has not been tested. The statement has been derived from the properties of the individual components.

Irritation / corrosion
Assessment of irritating effects: Not irritating to eyes and skin.

Skin
Species: rabbit
Result: non-irritant

Eye
Species: rabbit
Result: non-irritant

Sensitization
Assessment of sensitization: No sensitizing effect.

modified Buehler test
Species: guinea pig
Result: Non-sensitizing.

Aspiration Hazard
not applicable

Chronic Toxicity/Effects

Repeated dose toxicity

Assessment of repeated dose toxicity: The product has not been tested. The statement has been derived from the properties of the individual components.

Information on: ammonia
Assessment of repeated dose toxicity: After repeated administration the prominent effect is the induction of corrosion. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

Genetic toxicity
Assessment of mutagenicity: The product has not been tested. The statement has been derived from the properties of the individual components. Mutagenicity tests revealed no genotoxic potential.

Carcinogenicity
Assessment of carcinogenicity: The product has not been tested. The statement has been derived from the properties of the individual components. The results of various animal studies gave no indication of a carcinogenic effect.

Reproductive toxicity
Assessment of reproduction toxicity: The product has not been tested. The statement has been derived from the properties of the individual components. The results of animal studies gave no indication of a fertility impairing effect.

Teratogenicity
Assessment of teratogenicity: The product has not been tested. The statement has been derived from the properties of the individual components.

Information on: imazamox
Assessment of teratogenicity: Indications of possible developmental toxicity/teratogenicity were seen in animal studies.

Other Information
Misuse can be harmful to health.

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity:
There is a high probability that the product is not acutely harmful to aquatic organisms.

Aquatic plants
EC10 (7 d) 0.040 mg/l (growth rate), Lemna gibba

EC50 (7 d) 0.143 mg/l (growth rate), Lemna gibba

Chronic toxicity to fish

Information on: imazamox
No observed effect concentration (28 d) 1.22 mg/l, Cyprinodon variegatus
---

Chronic toxicity to aquatic invertebrates

Information on: imazamox
No observed effect concentration (21 d) > 10 mg/l, Daphnia magna (semistatic)

Assessment of terrestrial toxicity
With high probability not acutely harmful to terrestrial organisms.

Persistence and degradability

Assessment biodegradation and elimination (H2O)
The product has not been tested. The statement has been derived from the properties of the individual components.

Elimination information

Not readily biodegradable (by OECD criteria).

Assessment biodegradation and elimination (H2O)

Information on: imazamox

Bioaccumulative potential

Assessment bioaccumulation potential
The product has not been tested. The statement has been derived from the properties of the individual components.

Mobility in soil

Assessment transport between environmental compartments
The product has not been tested. The statement has been derived from the properties of the individual components.

Information on: imazamox

The substance will not evaporate into the atmosphere from the water surface.
Following exposure to soil, the product trickles away and can - dependant on degradation - be transported to deeper soil areas with larger water loads.

Additional information

Other ecotoxicological advice:
The ecological data given are those of the active ingredient. Do not release untreated into natural waters.

13. Disposal considerations

Waste disposal of substance:
Pesticide wastes are regulated. Improper disposal of excess pesticide, spray mix or rinsate is a violation of federal law. If pesticide wastes cannot be disposed of according to label instructions,

contact the State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container disposal:
Rinse thoroughly at least three times (triple rinse) in accordance with EPA recommendations. Consult state or local disposal authorities for approved alternative procedures such as container recycling. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers.

RCRA:
This product is not regulated by RCRA.

14. Transport Information

Land transport
USDOT

Not classified as a dangerous good under transport regulations

Sea transport
IMDG

Hazard class:	9
Packing group:	III
ID number:	UN 3082
Hazard label:	9, EHSM
Marine pollutant:	YES
Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains IMAZAMOX)

Air transport
IATA/ICAO

Hazard class:	9
Packing group:	III
ID number:	UN 3082
Hazard label:	9, EHSM
Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (contains IMAZAMOX)

Further information
Product may be shipped as non-hazardous in suitable packages containing a net quantity of 5 L or less under the provisions of various regulatory agencies: ADR, RID, ADN: Special Provision 375; IMDG: 2.10.2.7; IATA: A197; TDG: Special Provision 99(2); 49CFR: §171.4 (c) (2) and also the Special Provision 375 in Appendix B which is regulated in China "Regulations Concerning Road Transportation of Dangerous Goods Part 3: Index of dangerous goods name and transportation requirements" (JT/T 617.3)

15. Regulatory Information

Federal Regulations

Registration status:
Crop Protection TSCA, US released / exempt

EPCRA 311/312 (Hazard categories): Refer to SDS section 2 for GHS hazard classes applicable for this product.

State regulations

State RTK	CAS Number	Chemical name
NJ	57-55-6	Propylene glycol
PA	57-55-6	Propylene glycol

Safe Drinking Water & Toxic Enforcement Act, CA Prop. 65:

BASF Risk Assessment, CA Prop. 65:

Based on an evaluation of the product's composition and the use(s), this product does not require a California Proposition 65 Warning.

NFPA Hazard codes:
Health: 1 Fire: 0 Reactivity: 0 Special:

Labeling requirements under FIFRA

This chemical is a pesticide product regulated by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label.
CAUTION:
KEEP OUT OF REACH OF CHILDREN.
KEEP OUT OF REACH OF DOMESTIC ANIMALS.
HARMFUL IF ABSORBED THROUGH SKIN.
HARMFUL IF INHALED.
Avoid inhalation of dusts/mists/vapours.
Avoid contact with the skin, eyes and clothing.
Wash thoroughly after handling.

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2024/10/16

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

PROVIDED FOR YOUR GUIDANCE ONLY. BECAUSE MANY FACTORS MAY AFFECT PROCESSING OR APPLICATION/USE, WE RECOMMEND THAT YOU MAKE TESTS TO DETERMINE THE SUITABILITY OF A PRODUCT FOR YOUR PARTICULAR PURPOSE PRIOR TO USE. NO WARRANTIES OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS. IN NO CASE SHALL THE DESCRIPTIONS, INFORMATION, DATA OR DESIGNS PROVIDED BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE. FURTHER, YOU EXPRESSLY UNDERSTAND AND AGREE THAT THE DESCRIPTIONS, DESIGNS, DATA, AND INFORMATION FURNISHED BY OUR COMPANY HEREUNDER ARE GIVEN GRATIS AND WE ASSUME NO OBLIGATION OR LIABILITY FOR THE DESCRIPTION, DESIGNS, DATA AND INFORMATION GIVEN OR RESULTS OBTAINED, ALL SUCH BEING GIVEN AND ACCEPTED AT YOUR RISK.
END OF DATA SHEET

Safety Data Sheet

Preparation Date 28-Jan-2021 **Revision date** 06-Jan-2021 **Revision Number:** 1

1. Identification of the Substance/Preparation and of the Company/Undertaking

Identification of the product
Product Description Top Deck Aquatic Herbicide

Other means of identification
Product code 12-500A
Registration number(s) 70506-355

Recommended use of the chemical and restrictions on use
Recommended use Herbicide.
Uses advised against Activities contrary to label recommendation
Non labeled activities

Details of the Supplier of the Safety Data Sheet
Supplier Address
UPL NA Inc.
630 Freedom Business Center
Suite 402
King of Prussia, PA 19406

Emergency telephone number
Company Phone Number 1-800-438-6071
Emergency telephone number Chemtrec: (800) 424-9300 (24hrs) or (703) 527-3887
Medical: Rocky Mountain Poison and Drug Safety (866) 673-6671 (24hrs)

2. Hazards Identification

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Dermal	Category 4
Acute toxicity - Inhalation (Vapors)	Category 4
Skin Corrosion/Irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Skin sensitization	Category 1

Label elements

EMERGENCY OVERVIEW

WARNING

Hazard Statements
Harmful in contact with skin
HARMFUL IF INHALED
CAUSES SKIN IRRITATION
Causes serious eye irritation
May cause an allergic skin reaction

Appearance Clear **Physical state** Liquid **Odor** Mild aromatic

Precautionary Statements - Prevention
Wear protective gloves/protective clothing/eye protection/face protection
Do not get in eyes, on skin, or on clothing
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing should not be allowed out of the workplace

IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
IF ON SKIN: Wash with plenty of soap and water
Call a POISON CENTER or doctor if you feel unwell
Take off contaminated clothing and wash before reuse
If skin irritation or rash occurs: Get medical advice/attention
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards Not Otherwise Classified (HNOC)
OTHER INFORMATION
• MAY BE HARMFUL IF SWALLOWED
• Toxic to aquatic life
• Toxic to aquatic life with long lasting effects

3. Composition/information on Ingredients

Chemical name	CAS No	Weight-%
Imazamox	114311-32-9	12.1
Ammonium hydroxide	1336-21-6	2.5
1,2-Benzisothiazolin-3-one	2634-33-5	0.2

If CAS number is "proprietary", the specific chemical identity and percentage of composition has been withheld as a trade secret.

4. First aid measures

FIRST AID MEASURES

Eye contact Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Call a poison control center or doctor for treatment advice.

Skin contact Wash off immediately with soap and plenty of water. Call a poison control center or doctor for treatment advice.

Inhalation Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

Ingestion Call a physician or poison control center immediately. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person.

Most Important Symptoms and Effects, Both Acute and Delayed

Most Important Symptoms and Effects no data available.

Indication of Any Immediate Medical Attention and Special Treatment Needed

Notes to physician Treat symptomatically.

5. Fire-fighting measures

Suitable extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media None.

Specific hazards arising from the chemical
No information available.

Explosion data
Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions Avoid contact with skin and eyes. Use personal protective equipment. Avoid dust formation. Provide adequate ventilation. Remove all sources of ignition. Wash thoroughly after handling.

Environmental Precautions

Environmental precautions Consult a regulatory specialist to determine appropriate state or local reporting requirements, for assistance in waste characterization and/or hazardous waste disposal and other requirements listed in pertinent environmental permits. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Methods and material for containment and cleaning up

Methods for Clean-Up Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Sweep up and shovel into suitable containers for disposal.

7. Handling and Storage

Precautions for safe handling

Handling Wear personal protective equipment. Avoid dust formation in confined areas. Avoid contact with skin and eyes. Provide adequate ventilation. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Keep out of reach of children.

Conditions for safe storage, including any incompatibilities

Storage Keep away from open flames, hot surfaces and sources of ignition. Keep in properly labelled containers. Keep in a dry, cool and well-ventilated place.

incompatible materials No materials to be especially mentioned.

8. Exposure Controls/Personal Protection

Exposure guidelines This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering controls Investigate engineering techniques to reduce exposures. Local mechanical exhaust ventilation is preferred. Consult ACGIH ventilation manual or NFPA Standard 91 for design of exhaust systems. Provide appropriate exhaust ventilation at places where dust is formed.

Personal protective equipment

Eye/Face Protection Where there is potential for eye contact have eye flushing equipment available. Use eye protection to avoid eye contact. If splashes are likely to occur, wear:. Goggles.

Skin protection Wear protective gloves/clothing. Socks and footwear.

Respiratory protection Where airborne exposure is likely, use NIOSH approved respiratory protection equipment appropriate to the material and/or its components. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical goggles. If exposures cannot be kept at a minimum with engineering controls, consult respirator manufacturer to determine appropriate type equipment for given application. Observe respirator use limitations specified by NIOSH or the manufacturer. For emergency and other conditions where there may be a potential for significant exposure, use an approved full face positive-pressure, self-contained breathing apparatus. Respiratory protection programs must comply with 29 CFR 1910.134.

General hygiene considerations

Do not eat, drink or smoke when using this product. Remove and wash contaminated clothing before re-use. Wear suitable gloves and eye/face protection. Wash hands before breaks and immediately after handling the product. Wear respiratory protection.

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance Clear
Physical state Liquid
Odor Mild aromatic
color Light yellow

Property	VALUES	Remarks/ Method
pH		None known
Melting point/freezing point		None known
Boiling Point/Range		None known
Flash Point	> 94.1 °C	None known
Flammability (solid, gas)		None known
None known		**Specific gravity** 1.0484
None known		**Solubility in Other Solvents** No information available
None known		**Partition coefficient: n-octanol/water**
None known		**Autoignition temperature**
None known		**Decomposition temperature**
None known		**Viscosity**
None known		

9.2 OTHER INFORMATION

10. Stability and Reactivity

Reactivity

no data available

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
None under normal processing.

Conditions to avoid
Extremes of temperature and direct sunlight.

incompatible materials
No materials to be especially mentioned.

Hazardous decomposition products
Carbon oxides.

11. Toxicological Information

Information on Likely Routes of Exposure

Product information The information provided below is for a similar formulation:

Imazamox 120 =
Acute oral LD50 (rat) = 5000 mg/kg
Acute dermal LD50 (rat/rabbit) = >2000 mg/kg
Acute inhalation LC50 (rat) = >4.67 mg/L/ 4 hr

Inhalation May cause irritation of respiratory tract.

Eye contact May cause slight irritation.

Skin contact Substance may cause slight skin irritation.

Ingestion MAY BE HARMFUL IF SWALLOWED.

Information on Toxicological Effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.
Mutagenic effects no data available.
Carcinogenicity There are no known carcinogenic chemicals in this product.
Reproductive effects Not Available.
STOT - Single Exposure no data available.
STOT - Repeated Exposure no data available.
Aspiration hazard No information available.

Numerical Measures of Toxicity - Product information

LD50 Oral > 5000 mg/kg
LD50 Dermal > 2000 mg/kg
LC50 Inhalation 18.48 mg/l (1 hr)

12. Ecological Information

ecotoxicity

None known

Persistence/Degradability
no data available.

Bioaccumulation/ Accumulation
Bioaccumulative potential.

Chemical name	Log Pow
Imazamox 114311-32-9	Koc = 5.36 at 25°C (log Pow = 0.7)
1,2-Benzisothiazolin-3-one 2634-33-5	0.76

Other Adverse Effects
no data available

13. Disposal Considerations

Waste Treatment Methods

Waste Disposal Method Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide or rinsate is a violation of Federal law. If the wastes cannot be disposed of by use or according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Contaminated packaging Refer to product label.

Chemical name	Ammonium hydroxide

14. Transport Information

DOT

NOT REGULATED

IATA

NOT REGULATED

IMDG

NOT REGULATED

15. Regulatory Information

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

signal word CAUTION

Harmful if inhaled or absorbed through skin. For terrestrial uses, do not apply directly to water, or to areas where surface water is present, or to intertidal areas below mean high water mark.

International Inventories
USINV Present

DSL/NDSL	Not present
EINECS/ ELINCS	Not Present
ENCS	Not Present
China	Present
KECL	Not Present
PICCS	Not Present
AICS	Not Present
TSCA	Not Present

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Ammonium hydroxide 1336-21-6	1000 lb			X

CERCLA

Chemical name	RQ	CERCLA EHS RQs	RQ
Ammonium hydroxide 1336-21-6	1000 lb		RQ 1000 lb final RQ RQ 454 kg final RQ

CERCLA

Component	RQ
Ammonium hydroxide 1336-21-6 (2.5)	1000 lb

RCRA

Pesticide Information

Component	FIFRA - Restricted Use	FIFRA - Pesticide Product Other Ingredients	FIFRA - Listing of Pesticide Chemicals	California Pesticides - Restricted Materials
Imazamox 114311-32-9 (12.1)			X	
Ammonium hydroxide 1336-21-6 (2.5)			X	
1,2-Benzisothiazolin-3-one 2634-33-5 (0.2)			X	

State Regulations

State Right-to-Know

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ammonium hydroxide - 1336-21-6	X	X	X		

International regulations

U.S. EPA Label information

EPA Pesticide registration number 70506-355

16. Other Information

NFPA **HEALTH** 1 **flammability** 0 **Instability** 0 **Physical hazard** -

Preparation Date 28-Jan-2021
Revision date 06-Jan-2021
Revision Summary
Add to system

Disclaimer

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End of SDS

SAFETY DATA SHEET

EMERGENCY CALL: 1-800-424-9300 (CHEMTREC)

1. IDENTIFICATION

PRODUCT NAME: Alligare FlumigardSC
DESCRIPTION: A liquid herbicide
EPA Reg. No.: 81927-78

COMPANY IDENTIFICATION:
Alligare, LLC
1565 5th Avenue,
Opelika, AL 36801

2. HAZARD IDENTIFICATION

WARNING

Suspected of damaging fertility or the unborn child (H361)
Very toxic to aquatic life with long lasting effects (H400+H410)

HAZARD CLASSIFICATION

Health Hazard	Category
Reproductive toxicity	2

Physical Hazards	Category
None	--

Environmental Hazards	Category
Hazardous to the aquatic environment, short-term (acute)	1
Hazardous to the aquatic environment, long-term (chronic)	1

HAZARDS NOT REQUIRING CLASSIFICATION

Do not mix or allow coming in contact with oxidizing agents. Hazardous chemical reaction may occur.

PRECAUTIONARY STATEMENTS

Do not handle until all safety precautions have been read and understood. (P202)

Wear protective clothing as described in Section 8 of this document. (P280)

IF exposed or concerned: Get medical advice / attention. (P308+P313)

Avoid release to the environment in a manner not in accordance with the product label. Collect spillage. (P273+P391)

Store locked up. (P405)

Dispose of contents / containers at an approved waste disposal plant in accordance with local, State and Federal regulations. Refer to the product label for specific disposal instructions. (P501)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Common Name	Chemical Name	CAS #	Composition
Flumioxazin	2-[7-Fluoro-3,4-dihydro-3-oxo-4-(2-propynyl)-2*H*-1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1H-isoindole-1,3(2H)-dione	103361-09-7	42.0%
Propylene glycol	1,2-propanediol	57-55-6	<6.0%

Note: Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.

4. FIRST AID MEASURES

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-424-9300 for emergency medical treatment information.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Wash with soap and water. Get medical attention if irritation or symptoms develop.

IF INHALED: Move person to fresh air. If symptoms develop, get medical advice.

5. FIREFIGHTING MEASURES

Fire and Explosion Hazards: May thermally decompose in fire releasing irritating and toxic gasses.

Extinguishing Medium: Foam, dry extinguishing media, CO_2, water spray or fog.

Fire Fighting Instructions: Evacuate area of all unnecessary personnel and fight fire from a safe distance upwind. Contain contaminated water / firefighting water; do not allow to enter drains or waterways. Foam or dry chemical fire extinguishing systems are preferred to prevent environmental damage from excessive water runoff.

Fire Fighting Equipment: Firefighters should be equipped with self-contained positive pressure breathing apparatus and full bunker gear.

Hazardous Combustion Products: Thermal decomposition may produce gases such as fluorine compounds and oxides of carbon and nitrogen.

NFPA Ratings: Health – 1 / Flammability – 1 / Reactivity - 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Isolate area and keep unnecessary and unprotected personnel from entering. Wear suitable personal protective clothing and equipment as described in Section 8 of this document.

Small Spills: Absorb using sand, vermiculite or other inert absorbent. Place contained material in appropriate container for disposal.

Large Spills: Dike spillage and recover and retain as much free liquid as possible for reuse. Pick up remainder with suitable absorbent material. Place into suitable containers for reuse or disposal in a licensed facility. After removal, thoroughly clean contaminated area with a detergent slurry, absorb and sweep into container for disposal. Decontaminate tools and equipment following cleanup.

7. HANDLING AND STORAGE

Handling: Avoid breathing spray mist. Avoid contact with skin, eyes, or clothing. Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

Storage: Keep pesticide in original container. Store in a cool, dry, secure place. Do not put formulation or dilute spray solution into food or drink containers. Do not contaminate food or foodstuffs. Do not store or transport near feed or food. Not for use or storage in or around the home.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash station and a safety shower.

Exposure guidelines:

	OSHA		ACGIH		
Component	**TWA**	**STEL**	**TWA**	**STEL**	**Unit**
Flumioxazin	Not established	Not established	Not established	Not established	
Propylene glycol	10 (WEEL)	Not established	Not established	Not established	mg/m^3

Protective Clothing: Wear long-sleeved shirt and long pants, shoes, socks, and chemical resistant gloves made of any waterproof material.

General: Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	opaque off-white liquid	**pH:**	6-7 (1% w/w)
Odor:	mildly sweet	**Viscosity:**	non-Newtonian fluid
Melting / Freezing point:	not determined	**Water Solubility:**	soluble in water
Boiling Point / Boiling Range:	not determined	**Partition coefficient:**	not determined
Flammability:	not flammable	**Vapor Pressure:**	not determined
Flammability Limits (upper/lower):	not determined	**Density:**	1.15 g/cm^3
Flash Point (closed cup):	not determined		9.6 lbs./gal.
Auto-ignition Temperature:	not determined	**Vapor Density:**	not determined
Decomposition Temperature:	not determined	**Particle Characteristics:**	not determined

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Excessive heat. Do not store near heat or flame.

CHEMICAL STABILITY: Stable under normal use and storage conditions.

INCOMPATIBLE MATERIALS: Strong oxidizing agents such as chlorates, nitrates, and peroxides.

HAZARDOUS REACTIONS: This product is chemically stable. No hazardous reactions if stored and handled as prescribed/indicated.

HAZARDOUS DECOMPOSITION PRODUCTS: Under fire conditions, may product gases such as fluorine compounds and oxides of carbon and nitrogen.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

The following information is from a substantially similar product:

ORAL TOXICITY (rat LD_{50}): > 5000 mg/kg

DERMAL TOXICITY (rat LD_{50}): > 5000 mg/kg

INHALATION TOXICITY (rat LC_{50}): > 2.10 mg/L (4-hour) (no mortalities)

EYE IRRITATION: Non-irritating

SKIN IRRITATION: Slightly irritating

SKIN SENSITIZATION: Not a contact sensitizer

CARCINOGENICITY:

EPA: Not likely to be carcinogenic to humans (flumioxazin)

ACGIH:	Not Listed	**NTP:**	Not Listed
IARC:	Not listed	**OSHA:**	Not Listed

MUTAGENIC TOXICITY: No evidence of mutagenic effects during *in vivo* or *in vitro* studies for the active ingredient.

REPRODUCTIVE TOXICITY / DEVELOPMENTAL TOXICITY / TERATOGENICITY: Reproductive effects were observed in rats exposed to high levels of flumioxazin technical. Flumioxazin technical produced birth defects in the offspring of female rats.

OTHER TOXICITY: Compound related effects of flumioxazin technical noted in rats following subchronic exposures at high dose levels were hematotoxicity including anemia, and increases in liver, spleen, heart, kidney and thyroid weights. In dogs, the effects produced at high dose levels included a slight prolongation in activated partial thromboplastin time, increased cholesterol and phospholipid, elevated alkaline phosphatase, increased liver weights and histological changes in the liver. The lowest no-observable-effect-level (NOEL) in subchronic studies was 30 ppm in the three-month toxicity study in rats. Repeated exposures to flumioxazin technical in animals have produced anemia and other blood formation changes, organ weight changes and changes in blood chemistry. Flumioxazin technical did not produce cancer in life-time feeding studies in laboratory animals.

12. ECOLOGICAL INFORMATION

Flumioxazin technical is practically non-toxic to bees and avian species. It is slightly to moderately toxic to freshwater fish and moderately to highly toxic to aquatic invertebrates.

The following information is for the active ingredient, flumioxazin:

Rainbow Trout (96hr LC_{50}): 2.3 mg/L
Daphnia (96hr LC_{50}): >5.5 mg/L
Shrimp (96hr LC_{50}): 0.23 mg/L
Honeybee (contact LC_{50}): 105 µg/bee
Quail/mallard (oral LD_{50}): >2,250 mg/kg
Quail/mallard (dietary LC_{50}): >5,620 ppm

13. DISPOSAL CONSIDERATIONS

Do not contaminate water, food or feed by disposal.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Nonrefillable container, do not reuse or refill this container. Refer to product label for specific container disposal instructions.

14. TRANSPORT INFORMATION

UN Number:	UN3082
Proper Shipping Name:	Environmentally hazardous substance, liquid, N.O.S. (contains flumioxazin)
Transport Hazard Class:	9
Packing Group:	III
Hazard Zone:	None
Marine Pollutant:	Yes (flumioxazin)[1]
Hazardous Substance RQ:	None
Labels / Placards:	US-DOT: Class 9 Environmentally Hazardous Substance[2] IMDG, IATA: Class 9 Environmentally Hazardous Substance[3]
Emergency Guide:	171 (NAERG – North American Emergency Response Guide)
[1] **Marine Pollutant Note:**	Ground-only shipments are excluded from Marine Pollutant labeling requirements as per 49CFR§172.101 Appendix B(4). For any shipments involving all or part of the transport by vessel, the shipment must be classified as a Marine Pollutant unless a limited quantity exemption applies (see note 3 below).
[2] **US-DOT Note:**	Not regulated for “ground only” shipments.
[3] **IMDG / IATA Note:**	Not regulated for ground only shipments in single or inner packaging ≤ 1.3 gal. (5L).

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

FIFRA –

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. The following is the hazard information as required on the pesticide label:

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Harmful if inhaled or absorbed through skin. Causes moderate eye irritation.

See inside label booklet for additional Precautionary Statements and Directions for Use including Storage and Disposal instructions.

ENVIRONMENTAL HAZARDS

If not used in accordance with directions on the label, this product can be toxic to non-target plants and aquatic invertebrates. This pesticide is toxic to plants.

PHYSICAL OR CHEMICAL HAZARDS

Do not mix or allow coming in contact with oxidizing agents. Hazardous chemical reaction may occur.

All pesticides are governed under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The regulatory information presented below is pertinent only when this product is handled outside of the normal use and application as a pesticide. This product is excluded from listing requirements under EPA/TSCA.

SARA Title III – Section 302 Extremely Hazardous Substances
Not listed

SARA Title III – Section 311/312 Hazard Categories
Immediate

SARA Title III – Section 312 Threshold Planning Quantity
N/A

SARA Title III – Section 313 Reportable Ingredients
None

CERCLA –
Not listed

CALIFORNIA PROP 65 STATUS –
This product does not contain any chemical known to the state of California to cause cancer or reproductive harm.

CANADA –
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

16. OTHER INFORMATION

THIS INFORMATION IN THIS SDS IS BASED ON DATA AVAILABLE AS OF THE REVISION DATE GIVEN HEREIN, AND BELIEVED TO BE CORRECT. CONTACT ALLIGARE, LLC TO CONFIRM IF YOU HAVE THE MOST CURRENT MSDS. JUDGMENTS AS TO THE SUITABILITY OF THE INFORMATION HEREIN FOR THE INDIVIDUAL'S OWN USE OR PURPOSES IS NECESSARILY THE INDIVIDUAL'S OWN RESPONSIBILITY. ALTHOUGH REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF SUCH INFORMATION, ALLIGARE, LLC EXTENDS NO WARRANTIES, MAKES NO
REPRESENTATIONS, AND ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY OR SUITABILITY OF SUCH INFORMATION FOR APPLICATION TO THE INDIVIDUAL'S PURPOSES OR THE CONSEQUENCES OF ITS USE.

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

SAFETY DATA SHEET

EMERGENCY CALL: 1-800-424-9300 (CHEMTREC)

1. IDENTIFICATION

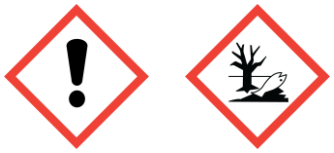
PRODUCT NAME: PROPELLER™ Aquatic Herbicide
DESCRIPTION: A granular herbicide
EPA Reg. No.: 81927-68

COMPANY IDENTIFICATION:
Alligare, LLC
13 N. 8th Street
Opelika, AL 36801

2. HAZARD IDENTIFICATION

WARNING

Harmful if inhaled (H332)
May be harmful in contact with skin (H313)
Causes eye irritation (H320)
Very toxic to aquatic life with long lasting effects (H410)



HAZARD CLASSIFICATION

Health Hazards	Category
Acute Toxicity – Inhalation	4
Acute Toxicity – Dermal	5
Eye Damage / Irritation	2B

Physical Hazards	Category
None	-

Environmental Hazards	Category
Hazardous to the Aquatic Environment – Acute	1
Hazardous to the Aquatic Environment – Chronic	1

HAZARDS NOT REQUIRING CLASSIFICATION

None

PRECAUTIONARY STATEMENTS

Avoid breathing dust. Use only outdoors or in a well-ventilated area. (P261+P271)

Wash hands thoroughly after handling. (P264)

Avoid release to the environment in a manner not in accordance with the product label. (P273)

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. (P305+P351+P338+P337+P313)

IF INHALED: Remove person to fresh are and keep comfortable for breathing. Call a poison control center or doctor if you feel unwell. (P304+P340+P312)

IF ON SKIN: Call a poison control center or doctor if you feel unwell. (P302+P312)

Collect spillage. (P391)

Dispose of contents / container in accordance with local regulations. Refer to the product label for specific disposal instructions. (P501)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Common Name	Chemical Name	CAS #	Composition
Flumioxazin	(2-[7-flouro-3,4-dihydro-3-oxo-4-(2-propynyl)-2H-1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1H-isoindole-1,3(2H)-dione)	103361-09-7	51.0%

4. FIRST AID MEASURES

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-800-424-9300 for emergency medical treatment information.

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15 to 20 minutes. Call a poison control center or doctor for treatment advice.

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.

5. FIREFIGHTING MEASURES

Flash Point: No data available

Flammability Limits: Not determined

Fire and Explosion Hazards: May thermally decompose in fire releasing irritating and toxic gases.

Means of Extinction: Use water fog or fine spray, CO_2, foam or dry chemical.

Fire Fighting Instructions: Does not burn, fight surrounding fire as appropriate. Evacuate area and fight fire upwind from a safe distance to avoid possible hazardous fumes and decomposition products. Dike runoff and do not allow runoff to enter sewers, storm drains or waterways. Foam and dry chemical extinguishing systems are preferred to prevent environmental damage from excessive water runoff. Decontaminate PPE and firefighting equipment before reuse.

Firefighting Equipment: Self-contained breathing apparatus with full face piece and full bunker gear.

Hazardous Combustion Products: Nitrogen and fluorine compounds may result.

NFPA Ratings: Health: 1 / Flammability: 1 / Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

Clean up spills immediately observing the precautions in Section 8 of this SDS. Isolate the hazard area and keep unnecessary and unprotected personnel from entering. Keep upwind of spill and ventilate area if possible. Prevent material from contaminating soil or from entering sewage and drainage systems and bodies of water.

Spills: Reduce airborne dust and vacuum or sweep up material and place in a chemical waste container. Wash spill area with soap and water, and pick up wash liquid with absorbent material and place in a chemical waste container.

7. HANDLING AND STORAGE

Handling: Avoid breathing dust and spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

Storage: Keep pesticide in original container. Store in a cool, dry, secure place. Do not put formulation or dilute spray solution into food or drink containers. Do not store or transport near feed or food. Not for use or storage in or around the home. Do not contaminate water, food or feed by storage, disposal or cleaning equipment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash station and a safety shower.

Protective Clothing: Applicators and other handlers must wear: long-sleeved shirt and long pants, socks, shoes and waterproof gloves.

General: Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Light brown granules
Odor:	Slight
Melting / Freezing point:	no data available
Boiling Point / Boiling Range:	no data available
Flammability:	not flammable
Flammability Limits:	no data available
Flash Point:	no data available
Auto-ignition Temperature:	no data available
Decomposition Temperature:	no data available
pH:	6-7
Kinematic Viscosity:	no data available
Solubility:	Dispersible
Partition coefficient:	no data available
Vapor Pressure:	no data available
Specific Gravity:	no data available
Bulk Density:	0.6 g/cm^3 (37 lbs/ft^3)

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Temperature extremes and direct sunlight.

CHEMICAL STABILITY: Stable under normal use and transportation situations.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

INCOMPATIBILITY WITH OTHER MATERIALS: Strong oxidizing agents.

HAZARDOUS REACTIONS: None known.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

The following information is for the technical material or a similar formulation:

ORAL TOXICITY (rat LD_{50}): > 5,000 mg/kg

DERMAL TOXICITY (rat LD_{50}): > 2,000 mg/kg

INHALATION TOXICITY (rat LC_{50}): > 2.18 mg/L (4-hour)

EYE IRRITATION: Brief and/or minor irritation

SKIN IRRITATION: Brief and/or minor irritation

SKIN SENSITIZATION: Not a sensitizer

CARCINOGENICITY:

IARC:	Not listed
US NTP:	Not listed
ACGIH:	Not listed

MUTAGENIC TOXICITY: No evidence of mutagenic effects during *in vivo* or *in vitro* studies.

REPRODUCTIVE TOXICITY: No evidence of reproductive or developmental toxicity.

12. ECOLOGICAL INFORMATION

This product is toxic to non-target plants and aquatic invertebrates. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to non-target plants and aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwaters or rinsate. Refer to the product label for additional information.

The following is for the active ingredient, Flumioxazin:

Rainbow trout (96-hr LC_{50}):	2.3 mg/L	Bobwhite Quail (Dietary LC_{50}):	> 5,620 ppm
Sheepshead minnow (96-hr LC_{50}):	> 4.7 mg/L	Bobwhite Quail (48-hr oral LD_{50}):	> 2,250 ppm
Daphnia magna (48-hr LC_{50}):	> 5.5 mg/L	Bees (acute contact):	> 105 µg/bee
Mysid shrimp (96-hr LC_{50}):	0.23 mg/L		

Rainbow trout (NOEC):	> 7.7 µg/L, < 16 µg/L
Mysid shrimp (NOEC):	> 15 µg/L, < 27 µg/L
Daphnia magna (NOEC):	> 52 µg/L, < 99 µg/L

13. DISPOSAL CONSIDERATIONS

Do not contaminate water, food or feed by disposal.

PESTICIDE DISPOSAL: Waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Nonrefillable container. Do not reuse or refill this container. Refer to the product label for specific container handling instructions.

14. TRANSPORT INFORMATION

UN Number:	UN3077
Proper Shipping Name:	Environmentally hazardous substance, solid, N.O.S. (contains Flumioxazin)
Transport Hazard Class:	9
Packing Group:	III
Hazard Zone:	A
Marine Pollutant:	Yes[1]
Hazardous Substance RQ:	None
Labels / Placards:	US-DOT: Class 9 Environmentally Hazardous Substance[2] IMDG, IATA: Class 9 Environmentally Hazardous Substance[3]
Emergency Guide:	171 (NAERG – North American Emergency Response Guide)
[1] **Marine Pollutant Note:**	Ground-only shipments are excluded from Marine Pollutant labeling requirements as per 49CFR§172.101 Appendix B(4). For any shipments involving all or part of the transport by vessel, the shipment must be classified as a Marine Pollutant unless a limited quantity exemption applies (see note 3 below).
[2] **US-DOT Note:**	Not regulated for “ground only” shipments.
[3] **IMDG / IATA Note:**	Not regulated when shipped in single or inner packaging ≤ 11 lbs. (5 kg) in strong outer packaging.

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

FIFRA –

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. The following is the hazard information as required on the pesticide label:

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION. Harmful if inhaled or absorbed through the skin. Causes moderate eye irritation. Avoid breathing dust and spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse. Wear long-sleeved shirt and long pants, socks, shoes and waterproof gloves.

See inside label booklet for additional Precautionary Statements and Directions for Use including Storage and Disposal instructions.

ENVIRONMENTAL HAZARDS

This product is toxic to non-target plants and aquatic invertebrates. Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to non-target plants and aquatic organisms in neighboring areas. Do not apply where runoff is likely to occur. Do not apply when weather conditions favor drift from treated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This pesticide is toxic to plants and should be used strictly in accordance with the drift and run-off precautions on this label in order to minimize off-site exposures.

Under some conditions this product may have a potential to run off to surface water or adjacent land. Where possible, use methods which reduce soil erosion, including no-till, limited till and contour plowing; these methods also reduce pesticide run-off. Use of vegetation filter strips along rivers, creeks, streams, wetlands or on the downhill side of fields where run-off could occur will minimize water run-off and is recommended.

All pesticides are governed under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The regulatory information presented below is pertinent only when this product is handled outside of the normal use and application as a pesticide. This product is excluded from listing requirements under EPA/TSCA.

SARA Title III – Section 302 Extremely Hazardous Substances
Not listed

SARA Title III – Section 311/312 Hazard Categories
Immediate

SARA Title III – Section 312 Threshold Planning Quantity
N/A

SARA Title III – Section 313 Reportable Ingredients
None

CERCLA –
Not listed

CALIFORNIA PROP 65 –
This product does not contain any chemicals known to the State of California to cause cancer or reproductive harm.

CANADA –
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

16. OTHER INFORMATION

THIS INFORMATION IN THIS SDS IS BASED ON DATA AVAILABLE AS OF THE REVISION DATE GIVEN HEREIN, AND BELIEVED TO BE CORRECT. CONTACT ALLIGARE, LLC TO CONFIRM IF YOU HAVE THE MOST CURRENT MSDS. JUDGMENTS AS TO THE SUITABILITY OF THE INFORMATION HEREIN FOR THE INDIVIDUAL'S OWN USE OR PURPOSES IS NECESSARILY THE INDIVIDUAL'S OWN RESPONSIBILITY. ALTHOUGH REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF SUCH INFORMATION, ALLIGARE, LLC EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS, AND ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY OR SUITABILITY OF SUCH INFORMATION FOR APPLICATION TO THE INDIVIDUAL'S PURPOSES OR THE CONSEQUENCES OF ITS USE.

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

SDS Version: 1.0 Effective Date: 10/1/2018

SAFETY DATA SHEET

ProcellaCOR SC

Section 1. Identification

GHS product identifier : ProcellaCOR SC

Recommended use of the chemical and restrictions on use

Identified uses : End use herbicide product

EPA Registration No. : 67690-79

Supplier's details :
SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm E.S.T.
www.sepro.com

Emergency telephone number (with hours of operation) **INFOTRAC - 24-hour service 1-800-535-5053**

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

Hazard classification: This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Other hazards: No data available.

Section 3. Composition/information on ingredients

Chemical nature: This product is a mixture.

Component	CASRN	Concentration
Florpyrauxifen-benzyl	1390661-72-9	26.46%
Propylene glycol	57-55-6	6.0%
Balance	Not available	67.54%

Section 4. First aid measures

Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.

Skin contact: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Eye contact: Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice.

Ingestion: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

Section 5. Fire-fighting measures

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

Unsuitable extinguishing media: No data available.

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen fluoride. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Consider feasibility of a controlled burn to minimize environment damage. Foam fire extinguishing system is preferred because uncontrolled water can spread possible contamination. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information. Spills or discharge to natural waterways is likely to kill aquatic organisms.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact SePRO Corporation for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

Section 7. Handling and storage

Precautions for safe handling: Keep out of reach of children. Do not swallow. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

Section 8. Exposure controls/personal protection

Control parameters: Exposure limits are listed below, if they exist.

Component	Regulation	Type of Listing	Value/Notation
Propylene glycol	US WEEL	TWA	10 mg/m3

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Wear clean, body-covering clothing.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Section 9. Physical and chemical properties

Appearance	
Physical State	Liquid
Color	Tan
Odor	Solvent
Odor Threshold	No data available
pH	5.47 1% *pH Electrode*
Melting point/range	Not applicable
Freezing point	No data available
Boiling point (760 mmHg)	No data available
Flash point	closed cup > 100 °C (> 212 °F) *Pensky-Martens Closed Cup ASTM D 93*
Evaporation Rate (Butyl Acetate =1)	No data available
Flammability (solid, gas)	No data available
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapor Pressure	No data available
Relative Vapor Density (air = 1)	No data available
Water solubility	No data available
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Kinematic Viscosity	No data available
Explosive properties	No

Oxidizing properties	No significant increase (> 5°C) in temperature.
Liquid Density	1.1278 g/ml at 20 °C (68 °F) *Digital density meter*
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

Section 10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical stability: Thermally stable at typical use temperatures.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose.

Incompatible materials: None known.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Hydrogen chloride. Hydrogen fluoride. Nitrogen oxides.

Section 11. Toxicological information

Toxicological information appears in this section when such data are available.

Acute toxicity

Acute oral toxicity Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.
As product: LD50, Rat, female, > 5,000 mg/kg

Acute dermal toxicity Prolonged skin contact is unlikely to result in absorption of harmful amounts.
As product: LD50, Rat, male and female, > 5,000 mg/kg

Acute inhalation toxicity No adverse effects are anticipated from single exposure to mist. Based on the available data, respiratory irritation was not observed.
As product: LC50, Rat, male and female, 4 Hour, dust/mist, > 5.66 mg/l No deaths occurred at this concentration.

Skin corrosion/irritation Brief contact is essentially nonirritating to skin.

Serious eye damage/ eye irritation May cause slight temporary eye irritation. Corneal injury is unlikely.

Sensitization Did not cause allergic skin reactions when tested in guinea pigs.
For respiratory sensitization: No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure) Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure) For the active ingredient(s): Based on available data, repeated exposures are not anticipated to cause significant adverse effects.
For the minor component(s): In animals, effects have been reported on the following organs: Respiratory tract.

Carcinogenicity For the active ingredient(s): Did not cause cancer in laboratory animals.

Teratogenicity For the active ingredient(s): Did not cause birth defects or any other fetal effects in laboratory animals.

Reproductive toxicity For the active ingredient(s): In animal studies, did not interfere with reproduction.

Mutagenicity For the active ingredient(s): In vitro genetic toxicity studies were negative.

Aspiration Hazard Based on physical properties, not likely to be an aspiration hazard.

Section 12. Ecological information

Ecotoxicological information appears in this section when such data is available.

Toxicity

Acute toxicity to fish Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L). The LC50 value is above the water solubility.
As product: LC50, *Cyprinus carpio* (Carp), 96 Hour, > 1.92 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates As product: EC50, *Daphnia magna* (Water flea), semi-static test, 48 Hour, > 80.0 mg/l, OECD Test Guideline 202
As product: EC50, eastern oyster (*Crassostrea virginica*), 96 Hour, > 1.08 mg/l

Acute toxicity to algae/aquatic plants Based on information for component(s): Material is very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species).

For the active ingredient(s): ErC50, *Myriophyllum spicatum*, 14 d, 0.000154 mg/l

For the active ingredient(s): NOEC, *Myriophyllum spicatum*, 14 d, 0.0000095 mg/l

As product: ErC50, *Pseudokirchneriella subcapitata* (green algae), 72 Hour, > 1.88 mg/l, OECD Test Guideline 201

Toxicity to Above Ground Organisms Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).
oral LD50, *Colinus virginianus* (Bobwhite quail), > 2000mg/kg bodyweight.

Persistence and degradability

Florpyrauxifen-benzyl

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
Biodegradation: 14.6 %
Exposure time: 29 d
Method: OECD Test Guideline 301B

Stability in Water (1/2-life)
Hydrolysis, DT50, 913 d, pH 4, Half-life Temperature 25 °C
Hydrolysis, DT50, 111 d, pH 7, Half-life Temperature 25 °C
Hydrolysis, DT50, 1.3 d, pH 9, Half-life Temperature 25 °C

Propylene glycol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation may occur under anaerobic conditions (in the absence of oxygen).
10-day Window: Pass
Biodegradation: 81 %
Exposure time: 28 d
Method: OECD Test Guideline 301F or Equivalent
10-day Window: Not applicable
Biodegradation: 96 %
Exposure time: 64 d
Method: OECD Test Guideline 306 or Equivalent

Theoretical Oxygen Demand: 1.68 mg/mg

Chemical Oxygen Demand: 1.53 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	69.0 %
10 d	70.0 %
20 d	86.0 %

Photodegradation
Atmospheric half-life: 10 Hour
Method: Estimated.

Balance

Biodegradability: No relevant data found.

Bioaccumulative potential

Florpyrauxifen-benzyl

Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water(log Pow): 5.5 at 20 °C
Bioconcentration factor (BCF): 356 *Lepomis macrochirus* (Bluegill sunfish) 30 d

Propylene glycol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -1.07 Measured
Bioconcentration factor (BCF): 0.09 Estimated.

Balance

Bioaccumulation: No relevant data found.

Mobility in soil

Florpyrauxifen-benzyl

Expected to be relatively immobile in soil (Koc > 5000).
Partition coefficient (Koc): 34200

Propylene glycol

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): < 1 Estimated.

Balance

No relevant data found.

Section 13. Disposal considerations

Disposal methods: If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

Section 14. Transport information

DOT Not regulated for transport

Classification for SEA transport (IMO-IMDG):

Proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (Florpyrauxifen-benzyl)
UN number	UN 3082
Class	9
Packing group	III
Marine pollutant	Florpyrauxifen-benzyl
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (Florpyrauxifen-benzyl)
UN number	UN 3082
Class	9
Packing group	III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

Section 15. Regulatory information

OSHA Hazard Communication Standard This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Pennsylvania Worker and Community Right-To-Know Act:

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Propylene glycol	57-55-6

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.
WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

United States TSCA Inventory (TSCA)

This product contains chemical substance(s) exempt from U.S. EPA TSCA Inventory requirements. It is regulated as a pesticide subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requirements.

Section 16. Other information

Hazard Rating System
National Fire Protection Association (U.S.A.)

Health: 0 Flammability: 1 Instability: 0

Legend

TWA	8-hr TWA
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

History

Date of issue mm/dd/yyyy	**:** 03/05/2018
Date of previous issue	: n/a
Version	: 1.0

Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SAFETY DATA SHEET

Revision date 24-Jun-2021 **Revision Number** 2

1. Identification

Product identifier

Product Name IMAZACAST

Other means of identification

Product Code(s) 000089

Synonyms None

Registration Number(s) 42750-314

Recommended use of the chemical and restrictions on use

Recommended use Herbicide

Restrictions on use Follow label instructions

Details of the supplier of the safety data sheet

Company Address
ALBAUGH LLC
1525 NE 36th St,
Ankeny, IA 50021 USA

Emergency telephone number

For Chemical Emergency Spill, Leak, Fire, Exposure, or Accident:
• Call CHEMTREC Day or Night within USA and Canada: 1-800-424-9300, Outside USA and Canada: +1 703-741-5970 (collect calls accepted)
For Medical Emergencies Only:
• Call Albaugh LLC Day or Night within USA and Canada: 1-888-347-6732

This product is an EPA FIFRA registered pesticide. Some classifications on this SDS are not the same as the FIFRA label. Certain sections of this SDS are superseded by federal law governed by US EPA for a registered pesticide. Please see Section 15. REGULATORY INFORMATION for explanation.

2. Hazard(s) identification

Classification

Acute toxicity - Inhalation (Dusts/Mists)	Category 4

Hazards not otherwise classified (HNOC)
Not applicable

Label elements

Warning

Hazard statements
Harmful if inhaled

Appearance Liquid **Physical state** Liquid **Odor** ammonium-like odor

Precautionary Statements - Prevention
Avoid breathing dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area

Precautionary Statements - Response

IF INHALED: Remove person to fresh air and keep comfortable for breathing
Call a POISON CENTER or doctor if you feel unwell

Other information
May be harmful if swallowed. May be harmful in contact with skin. Toxic to aquatic life with long lasting effects. Toxic to aquatic life.

3. Composition/information on ingredients

Substance

Not applicable.

Mixture

Chemical name	CAS No	Weight-%	Active Ingredient
Imazamox ammonium	247057-22-3	11.5-12.7	
Other Ingredients	PROPRIETARY	>80.0	

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First-aid measures

Description of first aid measures

General advice Show this safety data sheet to the doctor in attendance.

Inhalation Remove to fresh air. If symptoms persist, call a physician. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Eye contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact Wash skin with soap and water.

Ingestion Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious person. Get medical attention.

Self-protection of the first aider Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Avoid breathing vapors or mists. Use personal protective equipment as required. See section 8 for more information.

Most important symptoms and effects, both acute and delayed

Symptoms Coughing and/ or wheezing. Difficulty in breathing.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. Fire-fighting measures

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Large Fire CAUTION: Use of water spray when fighting fire may be inefficient.

Unsuitable extinguishing media Do not scatter spilled material with high pressure water streams.

Specific hazards arising from the chemical No information available.

Explosion data

Sensitivity to mechanical impact None.

Sensitivity to static discharge None.

Special protective equipment and precautions for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions Ensure adequate ventilation. Avoid breathing vapors or mists. Use personal protective equipment as required.

Other information Refer to protective measures listed in Sections 7 and 8.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers.

7. Handling and storage

Precautions for safe handling

Advice on safe handling Handle in accordance with good industrial hygiene and safety practice. Avoid breathing vapors or mists. Ensure adequate ventilation. In case of insufficient ventilation, wear suitable respiratory equipment. Do not eat, drink or smoke when using this product.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place. Keep out of the reach of children.

8. Exposure controls/personal protection

Control parameters

Exposure Limits The following ingredients are the only ingredients of the product above the cut-off level (or level that contributes to the hazard classification of the mixture) which have an exposure limit applicable in the region for which this safety data sheet is intended or other recommended limit. At this time, the other relevant constituents have no known exposure limits from the sources listed here.

Biological occupational exposure limits
This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies

Appropriate engineering controls

Engineering controls Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection No special protective equipment required.

Skin and body protection No special protective equipment required.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

General hygiene considerations Do not eat, drink or smoke when using this product.

9. Physical and chemical properties

Information on basic physical and chemical properties

Physical state	Liquid
Appearance	Liquid
Color	light yellow; Amber
Odor	ammonium-like odor
Odor threshold	No information available

Property	**Values**	**Remarks • Method**
pH	7.5 - 8.5	
pH (as aqueous solution)		
Melting point / freezing point	No data available	
Boiling point / boiling range	No data available	
Flash point	No data available	
Evaporation rate	No data available	
Flammability (solid, gas)	No data available	
Flammability Limit in Air		
Upper flammability or explosive limits	No data available	
Lower flammability or explosive limits	No data available	
Vapor pressure	<1.3 x 10-2 mPa (25°C) (Imazamox)	
Vapor density	No data available	
Relative density	No data available	
Water solubility	No data available	

Solubility(ies)	No data available
Partition coefficient	log Pow = -1.03 (pH5, uncorrected for dissociation), -2.4 (pH7, uncorrected), 0.73 (pH5&6, corrected) (all 25°C) (Imazamox)
Autoignition temperature	No data available
Decomposition temperature	
Kinematic viscosity	2.1 Cst (20°C); 1.3 mm2 /s (40°C)
Dynamic viscosity	No data available

Other information

Explosive properties	No information available
Oxidizing properties	No information available
Softening point	No information available
Molecular weight	No information available
VOC Content (%)	No information available
Liquid Density	1.01 – 1.05 g/ml (8.43 – 8.76 lb/gl)*
Bulk density	No information available

**Listed density is an approximate value and does not necessarily represent that of a specific batch*

10. Stability and reactivity

Reactivity No information available.

Chemical stability Stable under normal conditions.

Possibility of hazardous reactions None under normal processing.

Conditions to avoid Excessive heat.

Incompatible materials None known based on information supplied.

Hazardous decomposition products None known based on information supplied.

11. Toxicological information

Information on likely routes of exposure

Product Information

Inhalation Specific test data for the substance or mixture is not available. Harmful by inhalation. (based on components).

Eye contact Specific test data for the substance or mixture is not available.

Skin contact May be harmful in contact with skin.

Ingestion May be harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms Coughing and/ or wheezing.

Acute toxicity

Numerical measures of toxicity

The following values are calculated based on chapter 3.1 of the GHS document

Oral LD50 > 5,000 mg/kg

Dermal LD50	> 5,000 mg/kg
Inhalation LC50	> 4.0 mg/l

Component Information

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation	Classification not possible.
Serious eye damage/eye irritation	Not classified.
Respiratory or skin sensitization	Did not cause sensitization on laboratory animals.
Germ cell mutagenicity	No information available.
Carcinogenicity	No information available.
Reproductive toxicity	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Aspiration hazard	No information available.
Other adverse effects	No information available.
Interactive effects	No information available.

12. Ecological information

Ecotoxicity	Toxic to aquatic life. Toxic to aquatic life with long lasting effects.
Persistence and degradability	No information available.
Bioaccumulation	There is no data for this product.
Other adverse effects	No information available.

13. Disposal considerations

Disposal methods

Waste from residues/unused products	Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.
Contaminated packaging	Do not reuse empty containers.
California Hazardous Waste Status	This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. Transport information

DOT	Not regulated
IATA	Not applicable

TDG Not applicable

ICAO (air) Not applicable

IMDG Not applicable

15. Regulatory information

U.S. EPA Label Information

EPA Pesticide Registration Number 42750-314

EPA Pesticide Label CAUTION. Harmful if absorbed through skin or inhaled.

International Inventories

TSCA	Does not comply
DSL/NDSL	Does not comply
EINECS/ELINCS	Does not comply
ENCS	Does not comply
IECSC	Does not comply
KECL	Does not comply
PICCS	Does not comply
AIIC	Does not comply

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AIIC - Australian Inventory of Industrial Chemicals

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories
Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Water 7732-18-5	-	-	X

16. Other information

NFPA	**Health hazards** 3	**Flammability** 0	**Instability** 0	**Special hazards** -
HMIS	**Health hazards** 3	**Flammability** 0	**Physical hazards** 0	**Personal protection** X

Key or legend to abbreviations and acronyms used in the safety data sheet

Legend Section 8: Exposure controls/personal protection

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

Key literature references and sources for data used to compile the SDS

Agency for Toxic Substances and Disease Registry (ATSDR)
U.S. Environmental Protection Agency ChemView Database
European Food Safety Authority (EFSA)
EPA (Environmental Protection Agency)
Acute Exposure Guideline Level(s) (AEGL(s))
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act
U.S. Environmental Protection Agency High Production Volume Chemicals
Food Research Journal
Hazardous Substance Database
International Uniform Chemical Information Database (IUCLID)
Japan GHS Classification
Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)
NIOSH (National Institute for Occupational Safety and Health)
National Library of Medicine's ChemID Plus (NLM CIP)
National Library of Medicine’s PubMed database (NLM PUBMED)
National Toxicology Program (NTP)
New Zealand's Chemical Classification and Information Database (CCID)
Organization for Economic Co-operation and Development Environment, Health, and Safety Publications
Organization for Economic Co-operation and Development High Production Volume Chemicals Program
Organization for Economic Co-operation and Development Screening Information Data Set
World Health Organization

Revision date 24-Jun-2021
Revision Note No information available.

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

DISCLAIMER: The information presented herein is based on available data from reliable sources and is correct to the best of Albaugh's knowledge. Albaugh makes no warranty, express or implied, regarding the accuracy of the data or the results obtained from the use of this product. Nothing herein may be construed as recommending any practice or any product in violation of any law or regulations. The user is solely responsible for determining the suitability of any material or product for a specific purpose and for adopting any appropriate safety precautions. This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course. Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

End of Safety Data Sheet

CASTAWAY™

SAFETY DATA SHEET

EMERGENCY CALL: 1-800-424-9300 (CHEMTREC)

1. IDENTIFICATION

PRODUCT NAME: **Castaway**

DESCRIPTION: Liquid Herbicide

EPA Reg. No.: 91234-90

COMPANY IDENTIFICATION: **Atticus, LLC**
5000 CentreGreen Way, Suite 100
Cary, NC 27513

2. HAZARD IDENTIFICATION

WARNING

Causes eye irritation (H320)
Very toxic to aquatic life with long lasting effects (H410)

HAZARD CLASSIFICATION

Health Hazards	Category	Physical Hazards	Category
Eye Damage / Irritation	2B	None	-
		Environmental Hazards	**Category**
		Hazardous to the Aquatic Environment – Chronic	1

HAZARDS NOT REQUIRING CLASSIFICATION

None.

PRECAUTIONARY STATEMENTS

Wash hands thoroughly after handling. (P264)

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention. (P305+P351+P338+P337+P313)

Avoid release to the environment in a manner not in accordance with the product label. (P273)

Collect spillage. (P391)

Dispose of contents / container in accordance with local / Federal regulations as specified in the product label. (P501)

3. COMPOSITION / INFORMATION ON INGREDIENTS

Common Name	Chemical Name	CAS #	Composition
ammonium salt of imazamox	2-[4,5-dihydro-4-methyl-4-(1 -methylethyl)-5-oxo-1 H-imidazol-2-yl]-5-(methoxymethyl)-3-pyridinecarboxylic acid	247057-22-3	12.1%

NOTE: Ingredients not precisely identified are proprietary or non-hazardous. Values are not product specifications.

4. FIRST AID MEASURES

Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact SafetyCall at 1-844-685-9173 for emergency medical treatment. information.

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. If irritation continues, call a poison control center or doctor for treatment advice.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. If you do not feel well, call a poison control center or doctor for treatment advice.

5. FIREFIGHTING MEASURES

Flash Point: Not applicable

Fire and Explosion Hazards: Not available

Extinguishing Medium: Water spray, foam, dry chemical, or carbon dioxide (CO2). Avoid high volume water jet (contamination risk).

Fire Fighting Equipment: Firefighters should be equipped with self-contained positive pressure breathing apparatus and full bunker gear.

Fire Fighting Instructions: Evacuate area of all unnecessary personnel and fight fire from a safe distance upwind. Contain contaminated water / firefighting water; do not allow to enter drains or waterways. Use foam or dry chemical fire extinguishing systems to prevent environmental damage from excessive water runoff.

Hazardous Combustion Products: Thermal decomposition may release toxic and/or irritating fumes including oxides of carbon and nitrogen, and ammonium.

NFPA Ratings: Health – 1 / Flammability – 1 / Reactivity - 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Isolate area and keep unnecessary and unprotected personnel from entering. Wear suitable personal protective clothing and equipment as described in Section 8 of this document.

Environmental Precautions: Prevent material from entering public sewer systems, any waterways or low areas. Do not flush to drain or soil. Contain contaminated water.

Spill Cleanup: Clean up spill immediately observing precautions in Section 8. Spilled product should be recovered and applied according to label rates whenever possible. If recovery and application is not possible, dike spillage, pick up with suitable absorbent material, and place into suitable containers for disposal at a licensed facility. After decontamination wash spill area with water and collect wash water for approved disposal.

7. HANDLING AND STORAGE

Handling: Avoid breathing spray mist. Avoid contact with skin, eyes, or clothing. Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet. Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Storage: Keep out of the reach of children. Keep from freezing, do not store below 32°F.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash station and a safety shower.

Protective Clothing: Applicators, and other handlers must wear: Long-sleeved shirt and long pants, shoes plus socks, and chemical-resistant gloves made of waterproof material (such as barrier laminate, butyl rubber ≥14 mils, nitrile rubber ≥14 mils, neoprene rubber ≥14 mils, natural rubber ≥14 mils, polyethylene, polyvinyl chloride (PVC) ≥14 mils, or Viton ≥14 mils).

General: Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. DO NOT reuse them.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Transparent pale amber liquid
Odor:	mildly sweet
Melting/freezing point:	approx. 0°C (32°F)
Boiling point/Boiling range:	approx. 100°C (212°F)
Flammability:	not applicable
Flammability limits (upper/lower):	not applicable
Flash point:	not applicable
Auto-ignition temperature:	not applicable
Decomposition temperature:	not available
pH:	5-6
Viscosity:	2.3 cP @ 25°C
Solubility:	not available
Partition coefficient:	not available
Vapor pressure:	not available
Density (@25°C):	1.055 g/cm^3 8.80 lbs/gal
Relative vapor density:	not available
Particle characteristics:	not available

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: None known.

CHEMICAL STABILITY: Stable at normal temperatures and storage conditions.

INCOMPATIBILITY WITH OTHER MATERIALS: Strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: No hazardous decomposition products if stored and handled as prescribed.

HAZARDOUS POLYMERIZATION: Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Information presented below is from testing done on an identical or substantially similar product:

ORAL TOXICITY (rat LD_{50}): > 5,000 mg/kg

DERMAL TOXICITY (rat LD_{50}): > 4,000 mg/kg

11. TOXICOLOGICAL INFORMATION *(cont.)*

INHALATION TOXICITY (rat LC_{50}): > 5 mg/L (4-hour)

EYE IRRITATION: May cause moderate but temporary irritation

SKIN IRRITATION: May cause slight irritation

SKIN SENSITIZATION: Animal test did not cause sensitization by skin contact.

CARCINOGENICITY:
NTP: Not listed
IARC: Not listed
EPA: Not listed

MUTAGENIC TOXICITY: Testing of individual components of this product did not show mutagenic effects.

REPRODUCTIVE TOXICITY: Testing of individual components of this product did not show fertility or reproductive effects.

TERATOGENICITY: Testing of individual components of this product did not show developmental toxicity in animals at doses that were not toxic to the parents.

OTHER TOXICITY: No data available.

12. ECOLOGICAL INFORMATION

The following information is for the active ingredient, imazamox:

Sheepshead Minnow (96h LC_{50}):	> 97 mg/L
Green Algae (72h EC_{50}):	29.1 mg/L
Lemna gibba (7d EC_{50}):	0.031 mg/L

13. DISPOSAL CONSIDERATIONS

PESTICIDE DISPOSAL: Do not contaminate water, food or feed by disposal. Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Nonrefillable container, do not reuse or refill this container. See container labeling for complete disposal instructions.

14. TRANSPORT INFORMATION

UN Number:	UN3082
Proper Shipping Name:	Environmentally hazardous substance, liquid, N.O.S. (contains imazamox)
Transport Hazard Class:	9
Packing Group:	III
Hazard Zone:	A
Marine Pollutant:	Yes[1]
Hazardous Substance RQ:	None
Labels / Placards:	US-DOT: Class 9 Environmentally Hazardous Substance[2] IMDG, IATA: Class 9 Environmentally Hazardous Substance[3]
Emergency Guide:	171 (NAERG – North American Emergency Response Guide)
[1] **Marine Pollutant Note:**	Ground-only shipments are excluded from Marine Pollutant labeling requirements as per 49CFR§172.101 Appendix B(4). For any shipments involving all or part of the transport by vessel, the shipment must be classified as a Marine Pollutant unless a limited quantity exemption applies (see note 3 below).
[2] **US-DOT Note:**	Not regulated for "ground only" shipments.
[3] **IMDG / IATA Note:**	Not regulated when shipped in single or inner packaging ≤ 1.3 gallons (5.0L) in strong outer packaging.

14. TRANSPORT INFORMATION *(cont.)*

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

FIFRA –
This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. The following is the hazard information as required on the pesticide label:

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
CAUTION. Harmful if absorbed through skin or inhaled. Avoid contact with skin, eyes, or clothing.

ENVIRONMENTAL HAZARDS
This pesticide may be hazardous to plants outside the treated area. DO NOT contaminate water when disposing of equipment washwaters and rinsate.

PHYSICAL / CHEMICAL HAZARDS
Do not mix or allow coming into contact with oxidizing agents, as a hazardous chemical reaction may occur.

All pesticides are governed under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The regulatory information presented below is pertinent only when this product is handled outside of the normal use and application as a pesticide. This product is excluded from listing requirements under EPA/TSCA.

SARA Title III – Section 302 Extremely Hazardous Substances
Not listed

SARA Title III – Section 311/312 Hazard Categories
Immediate

SARA Title III – Section 312 Threshold Planning Quantity
The threshold planning quantity (TPQ) for this product treated as a mixture is 10,000 lbs. This product contains no ingredients with a TPQ of less than 10,000 lbs.

SARA Title III – Section 313 Reportable Ingredients
None

CERCLA Reportable Quantity (RQ) –
Not listed

CALIFORNIA PROP 65 STATUS –
This product does not contain any chemicals known to the State of California to cause cancer or reproductive harm.

CANADA –
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

16. OTHER INFORMATION

This Safety Data Sheet (SDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA APPROVED PRODUCT LABELING (attached to and accompanying the product container). This SDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

To the extent consistent with applicable law, neither Atticus, LLC nor Seller be liable for any incidental, consequential or special damages resulting from the use or handling of this product. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF ATTICUS, LLC AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF ATTICUS, LLC OR SELLER, THE REPLACEMENT OF THE PRODUCT.

SDS Version: 1.0 Effective Date: 03/15/2019

Semera-51.0-WDG-Specimen

https://labelsds.com/images/user_uploads/Semera%20.51%20Label%207-30-19.pdf

Clipper SDS

https://aquaticcontrol.com/wp-content/uploads/2023/02/Clipper-SC-SDS.pdf