

HYATT HIDDEN LAKES RESERVE

Discovery Phase Report

Boise, Idaho

April 2025

Ecosystem Science, LLC

Science · Planning · Design

DRAFT

**HYATT HIDDEN LAKES RESERVE
DISCOVERY PHASE REPORT**

Prepared:

April 2025

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It should not be relied upon; consult the final report.

Ecosystem Sciences

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1 PURPOSE AND NEED

1.1 INTRODUCTION

The City of Boise owns and manages Hyatt Hidden Lakes Reserve, which was acquired in 1997 and was most recently developed in 2013 with support from local partnerships and EPA grants. The 2013 phase of construction focused on rewilding the site and reintroducing native species to improve the ecological function of the reserve. The Wetlands Group, LLC. (e.g., Wetlands Group) constructed wetlands at the Hyatt Hidden Lakes which was to function as a wetland mitigation bank (Wetlands Group 2012). The construction created 7.09 acres of wetlands, which are in addition to the 24.8 acre existing “wetland complex” (Wetlands Group 2012).

Today, the Hyatt Hidden Lakes is recognized as a desired recreation area and valued for its positive public perception. The City of Boise aims to build on these achievements and positive view of the Reserve by developing a Long-Term Maintenance Plan. This document serves as a discovery report, which is the first step in creating a long-term maintenance plan. The discovery report focus is to document current conditions (wetland extent), comparing current to expected conditions (original expected wetlands), and addressing maintenance and invasive species issues that the City has experienced since taking over management of the Reserve.

1.2 PROJECT BACKGROUND

Hyatt Hidden Lakes Reserve, originally a family farm and later an excavated gravel pit until the 1980s, is now a 54-acre urban wildlife refuge near downtown Boise (Figure 1). The reserve is named after Lawrence Hyatt, who acquired the land in 1990 with a vision for ecological restoration. The city of Boise purchased the initial 22 acres in 1997. The city expanded the reserve by purchasing an additional 22 acres and acquiring an adjacent 10-acre parcel from Ada County Highway District (ACHD). The Reserve’s Master Plan, developed in July 2000, outlined goals for restoring upland meadows, creating a protected sagebrush habitat, and constructing a habitat island to enhance biodiversity.

In 2008 the City applied for and received a \$1.3 million EPA Decentralized Stormwater Demonstration Grant in general conformance with the Park Master Plan, to establish an innovative stormwater treatment pilot project at the site. The grant aimed to demonstrate new stormwater technology and provide educational opportunities for the public. The Land Group and the Wetlands Group were both contracted during this period. The Land Group worked alongside Boise Public Works to create a plan for a Decentralized Storm Water Treatment System with ACHD and Settlers Irrigation District (SID). The Wetlands Group was a project sponsor and entered a Memorandum of Agreement (MOA) with the City of Boise. This agreement granted The Wetlands Group, LLC the authorization to establish a mitigation bank on the site. A mitigation bank is a site where natural resources, such as wetlands, are restored, created, or preserved to offset environmental impacts from other projects. The bank credits generated by this restoration can be used to fulfill regulatory requirements for compensatory mitigation related to development projects that impact natural resources. Since completion, the Hyatt Hidden Lakes has functioned and maintained wetlands, while serving as prime recreation destination for locals. The City of Boise invests considerable resources in managing the Reserve. These resources include devoting personnel hours to monitor water levels, clean-out the outlet structure, combating invasive and non-desirable species, and maintaining the natural environment that people have come to love about the Reserve. This document examines the Hyatt Hidden Lakes historic and

current conditions to garner a better understanding of the site, and to determine future actions that aide the City of Boise's Management of the Reserve.

1.3 PURPOSE AND SCOPE

This Discovery Report aims to provide the City of Boise with targeted recommendations for managing Hyatt Hidden Lakes Reserve. The focus of this report is on maintenance activities and achieving vegetation and wetland function goals. The City of Boise identified two major concerns that they wanted addressed:

- 1.) The amount of vegetation debris floating to the outlet structure (Hyatt Dam) has caused maintenance issues and affected the City's ability to maintain a consistent water level.
- 2.) The city was concerned that the wetlands were not achieving the intended goals and may be on a poor ecosystem trajectory, including an increase in non-native or invasive species.

The report documents current conditions at Hyatt Hidden Lakes and examines what led to the current conditions at the Reserve. The current wetland cover types (open water, emergent marsh, shrub-scrub, and forested) are not currently meeting the goals of the original design. The report addresses historical challenges with understanding irrigation water delivery volumes to the site as well as stormwater flow additions. Understanding the volume of water entering the site is specifically important, as the City of Boise has encountered problems maintaining a consistent water level. The water level is controlled by a check structure at one location (Hyatt Dam). The wetlands at Hyatt Hidden Lakes are constructed and managed wetlands whose design calls for the water level to be maintained at a specific elevation. Wetlands, both natural and constructed, experience cyclical and seasonal variations in hydrology. At Hyatt Hidden Lakes, consistent water level is important to creating proper wetland hydrology throughout the site and minimizing erosion of wetland vegetation associated with fluctuating water surface elevations (which creates management challenges). Keeping a consistent water level at the site has been a challenge to achieve, due to issues associated with management of the baffle (e.g., protective plate adjacent to the outlet structure). Keeping the baffle clear is paramount to maintaining a consistent water level, allowing water to flow through the outlet structure and not causing fluctuations in water surface elevation associated with clogging and unclogging of the outlet structure.

This discovery report examines control and management of the invasive reed species, *Phragmites*, within the boundaries of the park. This report outlines the spatial extent that this species has invaded the wetland complexes, and the factors contributing to its presence and potential expansion within the Hyatt wetlands. Finally, the report offers a detailed set of recommended actions for effectively controlling and eliminating *Phragmites*, along with strategies for restoring native vegetation to prevent future re-infestations. The recommendations provided in this document will serve to inform a long-term maintenance plan for the Hyatt Hidden Lakes Reserve.



Figure 1. Hyatt Hidden Lakes Reserve (2023 NAIP & OpenStreetMap)

2 ENVIRONMENTAL SETTING

2.1 LOCATION AND CONTEXT

Hyatt Hidden Lakes Reserve sits in Boise's West Bench Neighborhood, just six miles from downtown Boise. West McMillan Road runs along the reserve's southern border, and South Maple Grove Road hugs the North and East perimeter. The site consists of 55-acres of wildlife habitat and wetlands designed for passive recreation (e.g., walking, hiking bird watching, etc.) Swimming, boating, and fishing are not allowed at the site.

2.2 HYATT HIDDEN LAKES MANAGEMENT

The City of Boise manages the Hyatt Hidden Lakes Reserve, with the Parks and Recreation and Public Works Departments both having important management purviews. Water delivery to the Hyatt Hidden Lakes is managed by the Settlers Irrigation District (SID), whose canal system receives stormwater. Stormwater is also discharged to the Reserve from North Maple Grove, and the Ada County Highway District (ACHD) is the owner of the stormwater infrastructure. The reserve has a water treatment facility that receives stormwater and treats it using a sand filtration method.

2.2.1 Hydrology (Water Delivery)

The SID owns and operates an irrigation canal along the southern boundary of the Hyatt Hidden Lakes property, and this canal provides water to the Reserve. SID owns, operates, and maintains the complete flow augmentation spillway structure to the Reserve (including a pipe/gate connection to drain the bottom of the settlers' canal during non-irrigation season). Discharges into the Hyatt wetlands from settlers' canal should be limited to 20 cubic feet per second (CFS) over 24-hour period (exclusive of discharges of city water rights for the wetlands). We were not able to obtain a record of the amount and timing of water discharged into the wetland complex from the SID Canal. However, project documentation states that in no case shall discharges be allowed to exceed the maximum allowed water surface elevation of 2,632.00 (Section 4 of 2011 Agreement [COB, SID, ACHD]). SID will only discharge into the Hyatt wetlands to alleviate irrigation season high intensity rainfall accumulation, to drain the canal during non-irrigation season, and provide irrigation flows as requested by the city (Section 4 of 2011 Agreement [COB, SID, ACHD]).

Unfortunately, there is no existing data that documents water delivery to Hyatt Hidden Lakes. Therefore, it is assumed that water delivery (above the City's water right) to the Hyatt Hidden Lakes Reserve is at SID's discretion. The water surface elevation is set by the Hyatt Dam, a check structure to maintain a consistent water level. Since the inputs to the Reserve from the canal and stormwater are not measured or under the control of the City, its only management tool is the Hyatt Dam.

Water flowing out of the Hyatt Hidden Lakes Reserve is eventually routed to the Thurman Mill Canal, which provides irrigation flows to property owners to the west.

2.2.2 Stormwater

Stormwater enters the Hyatt Hidden Lakes Wetland Complex from two sources. The first source is West McMillan Road and North Maple Grove Road stormwater infrastructure that drains to the Settlers' Canal. The second source is two outfalls that are connected to stormwater infrastructure

along North Maple Grove Road and accept flow from the road and the residential area to the east of North Maple Grove Road (San Marino Park Subdivision).

Stormwater from Settlers Canal drains to the stormwater treatment sand filter at the southwest corner of the site, which is the complex system constructed with EPA funding and designed for efficient stormwater management. This system receives stormwater through inlet piping connected to the adjacent roads that drain into Settlers Canal. The system includes a sediment basin, which captures and settles particulates before the water is conveyed through outlet structures into the filtration area. The filter section features a grass surface over a six-inch layer of topsoil amended with aluminum chloride, followed by an 18-inch layer of ASTM C33 sand and a 12-inch layer of 2-inch drain rock, all set on a filter bed with a 1% slope toward the wetland perimeter. Surrounding this system is a perimeter access road to facilitate operation and maintenance. Treated stormwater is collected and conveyed through a dedicated system, ensuring effective integration into the reserve's wetland ecosystem. Flows of up to 50 cfs may be discharged to the wetland. Of this amount, a maximum flow of 13cfs can be directed to the stormwater treatment system with the remaining 37cfs being discharged directly to the wetland. While specific water flow rates are acknowledged in the background documents, there is no data that documents the rate of flow into this area since construction completed.

The second source of stormwater to the Hyatt Hidden Lakes Wetland Complex drains North Maple Grove Road and the San Marino Park Subdivision. There are two outfalls that discharge stormwater into the Reserve. Both outfalls are just west of North Maple Grove Road, and discharge near the Hyatt Hidden Lakes elevation, but not directly into the wetlands. There are no sand filters or sediment basins associated with these outfalls, indicating untreated stormwater is flowing into the Reserve. There are no monitoring devices on these outfalls either, meaning there is no discharge data. Field observations indicate that significant stormwater volumes discharge from each outfall. Flow channels emanating from each outfall is evident, as well as debris build-up from high flows.

2.2.3 Hyatt Dam (Outlet Structure & Baffle)

Hyatt Dam is a concrete dam located near the north end of the Hyatt Wetlands. The dam is approximately sixty feet long and eight feet wide and is made entirely of concrete. The dam also has a trash rack (aka baffle), a flow control weir with outlet slot and a gated outlet pipe on the upstream face of the dam. Hyatt Dam provides 6 inches of free board above the maximum operation elevation. Since the City does not have control of inflows in the Hyatt Hidden Lakes Preserve, the management of Hyatt Dam is the only management tool the City has to maintain the hydrology required to accomplish its goals for the park.

The dam crest elevation is 2632.0. Project documentation states “the maximum water surface height on the upstream side of the dam (for very short durations) should be limited to 2631.5ft in order to maintain a minimum freeboard of six inches.” Water flowing through Hyatt Dam travels through a stream course for roughly 300 ft. At that point, streamflow enters ACHD owned stormwater infrastructure and is conveyed to the northeast, under North Maple Grove Road, into a retention pond. At that point all flow is routed towards and subsequently into Thurman Mill Canal.

Project documentation states that the City of Boise will perform maintenance to keep the outlet structure at Hyatt Dam clear of debris. Maintenance by City staff includes trash rack cleaning and seasonal adjustments to the dam outlet weir. Seasonal adjustments to the dam outlet weir may be required in order to control water surface elevations in the wetland. As an example, prior to the start of the irrigation season, the wetland water surface elevations above the dam are at seasonal lows (estimated water surface elevations of 2629.3 to 2629.5). The designed normal

water surface elevation above the dam is 2629.8 to 2630.0. A metal plate can be set in front of the weir at a top elevation of 2630.0 to hold flows in the wetland until that level is reached. Once the water level reaches 2630.0 the metal plate can be removed. Project documentation states that the trash rack (aka Baffle) shall be inspected weekly and cleaned as needed and after large flow events (stormwater or irrigation discharges to the wetland) (Appendix C ACHD/City of Boise Interagency Agreement). Seasonal adjustments to the dam outlet weir are required to control water surface elevations in the wetland. From the Hyatt Dam and Wetland Outlet Channel section of Appendix C of the Interagency Agreement, states that “As an example, prior to the start of the irrigation season, the wetland water surface elevations above the dam are at seasonal lows (water surface elevation 2629.3 to 2629.5). The desired and normal water surface elevation above the dam is 2629.8 to 2630.0.” Since project inception, and coupled with the growth of the wetland, these values may not be relevant anymore.

Recent topographic surveys, performed by the City of Boise, indicate that the water surface elevations vary seasonally, but are generally below 2,632.5ft in Hyatt Hidden Lakes, which is slightly above project design elevations. Based on the City of Boise surveys, the outlet elevation is 2632.047ft in elevation with a water surface of 2632.47ft on September 27th, 2024. Project documentation states that the water surface elevation (WSE) should be at or below 2632.0 ft. It may be below this elevation for months of every year. Without data collection on the WSE, we can only make assumptions based on available data.

One focus of this report is to ascertain the role of WSE in Hyatt Hidden Lakes Reserve wetland function. The City of Boise has indicated that the most likely cause of increased water surface elevation and rapidly changing WSE is blockages at the outlet structure. Blockages are primarily in the form of wetland (e.g. *Typha latifolia*) plant rootballs and dead vegetation that dislodge from where they are rooted and float towards and block the outlet structure. To combat the issue the City of Boise increased the frequency of cleaning out the outlet structure. During one unfortunate cleaning out event the Baffle (e.g., trash guard in front of the outlet structure) was damaged. In February of 2023, a new trash guard was fabricated and installed at the site. The new guard, constructed from a durable 3/16” stainless steel plate, was designed to extend three feet into the water, providing increased resilience and functionality. This change was significant for several reasons. First, the improved durability of the stainless-steel plate ensures the guard will better withstand future impacts and environmental wear, reducing the likelihood of additional repairs or replacements. Second, extended design enhances the guard’s effectiveness in preventing debris from entering and clogging critical infrastructure. Lastly, documenting this repair and its cost highlights the ongoing maintenance and financial investment required to sustain the site’s infrastructure, underscoring the importance of proactive planning and resource allocation in future management strategies.

2.3 CONSTRUCTED MITIGATION WETLANDS

Prior to the City of Boise purchasing the Hyatt Hidden Lakes Property, approximately 22 of the 44-acre site were considered wetland. The wetlands at the time of purchase occurred at the bottom of an exhausted gravel pit. As mentioned above, following the acquisition of the Hyatt Hidden Lakes property the City of Boise began the planning for and subsequent restoration of upland habitats and creation of wetland habitats. The work centered on the native sagebrush habitat, and the construction of habitat islands to enhance biodiversity.

The Wetlands Group designed and constructed additional wetland acreage at the site beginning in 2012 (Figure 2). The goal of the project was to create a Wetlands Mitigation Bank for Hyatt Hidden Lakes Reserve. Before the project began, the selected area of the Reserve (e.g.,

northwest corner) contained only 0.63 acres of existing wetlands, representing a small, isolated wetland area. The Wetlands Group's original mitigation work plan aimed to significantly expand and enhance wetland acreage, creating a total of 7.09 acres of new wetland habitat. The Wetlands Group plan included the development of 1.39 acres of palustrine emergent (PEM) wetland, 2.97 acres of palustrine scrub-shrub (PSS) wetland and 2.73 acres of palustrine forested (PFO) wetland. The goal was to create a multi-level wetland complex with graminoids (e.g., cattail) adjacent to shrubs (e.g., willow) with a forest (e.g., Cottonwood) overstory (Figure 2). The Mitigation Bank Design Plans specified a grading elevation of 2,630.5ft for the PEM area, 2,631ft for the PSS area, and 2,631.5ft for the PFO area (Figure 3). The conceptual cross-section (Figure 4) shows how the types of wetland (PEM, PSS, PFO) relate to these ground surface elevations. The project design incorporated the existing 0.63 acres of wetland (i.e., 0.2 acres of PEM, and .43 acre of PSS) into the newly created system, and connected it to the larger 24.8-acre wetland complex in the Hyatt Hidden Lakes Reserve via two culverts (*Note: Only 1 culvert found during field evaluation*). Notably, no modifications were made to the existing wetlands within the Hyatt Hidden Lakes Reserve, ensuring the preservation of the original wetland ecosystem.

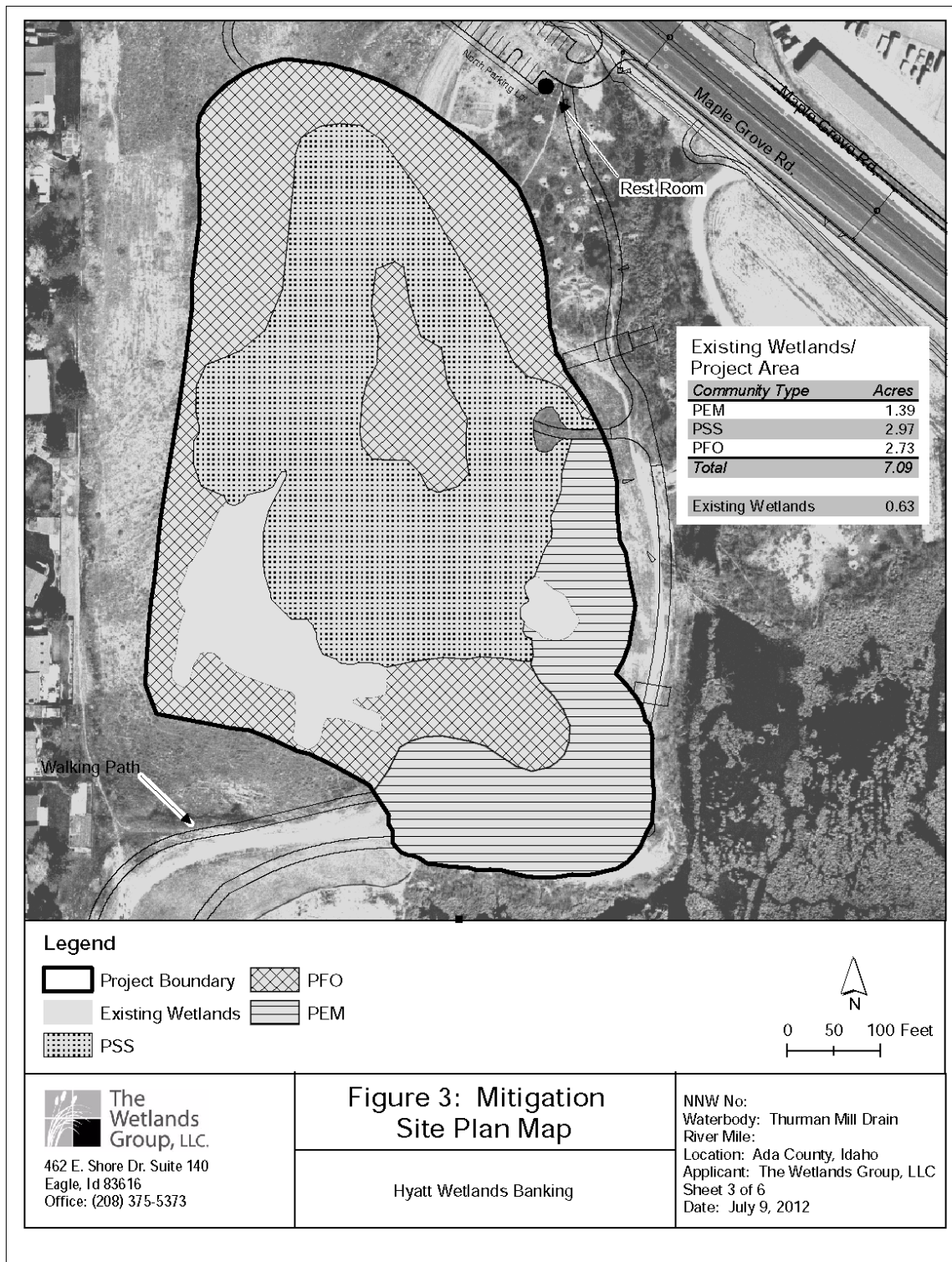


Figure 2. Wetland Groups (2012) Mitigation Site Plan

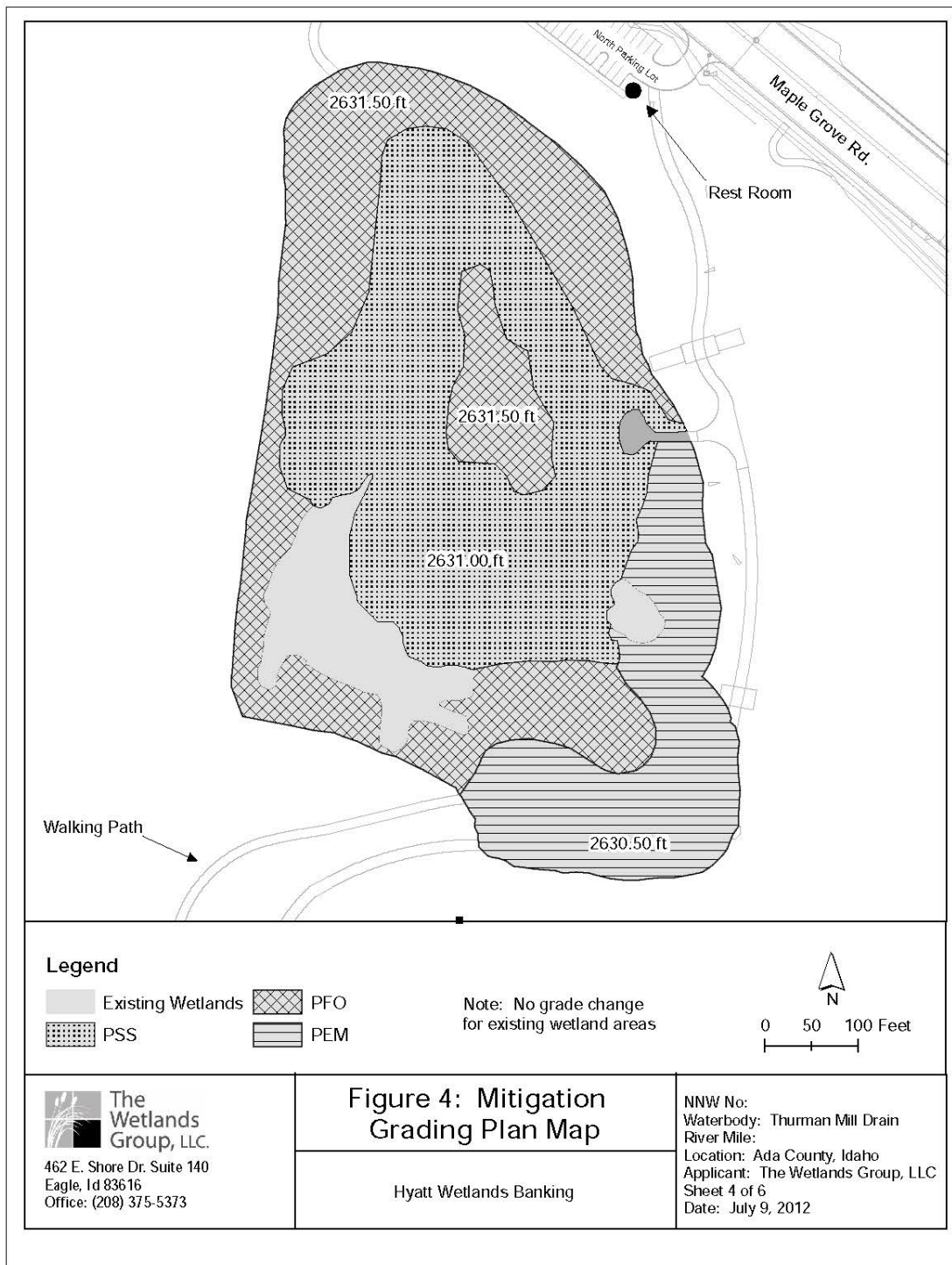


Figure 3. Designed elevations of the constructed mitigation wetland and Hyatt Hidden Lakes (Wetlands Group 2012).

The constructed wetland area was designed to contain high-quality ecological characteristics. The strategic location, adjacent to the existing 24.8-acre wetland complex, enhanced the broader ecological value of the entire reserve. The constructed aquatic systems were designed to be self-sustaining and reflective of local and regional aquatic ecotypes, ensuring long-term functionality and integration into the reserve's ecosystem.

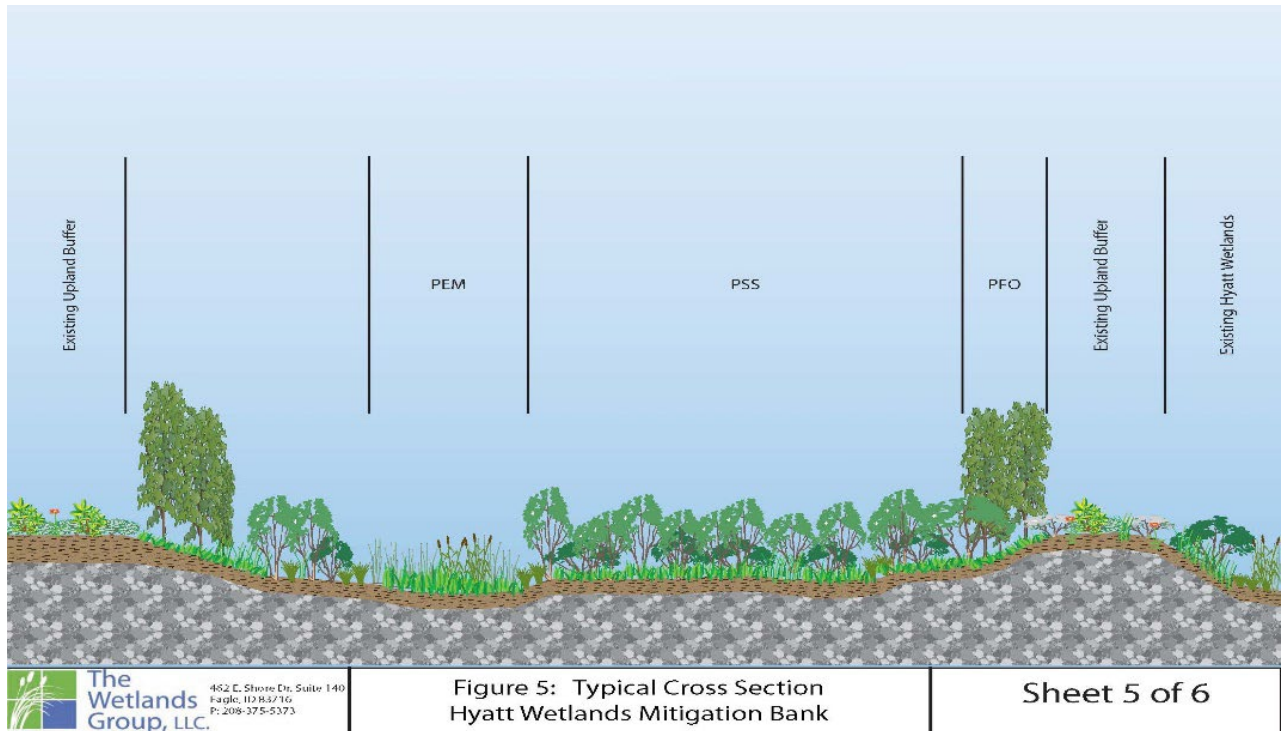


Figure 4. Example of Wetland Vegetation Types (Wetlands Group 2012).

3 DATA GATHERING AND ANALYSIS

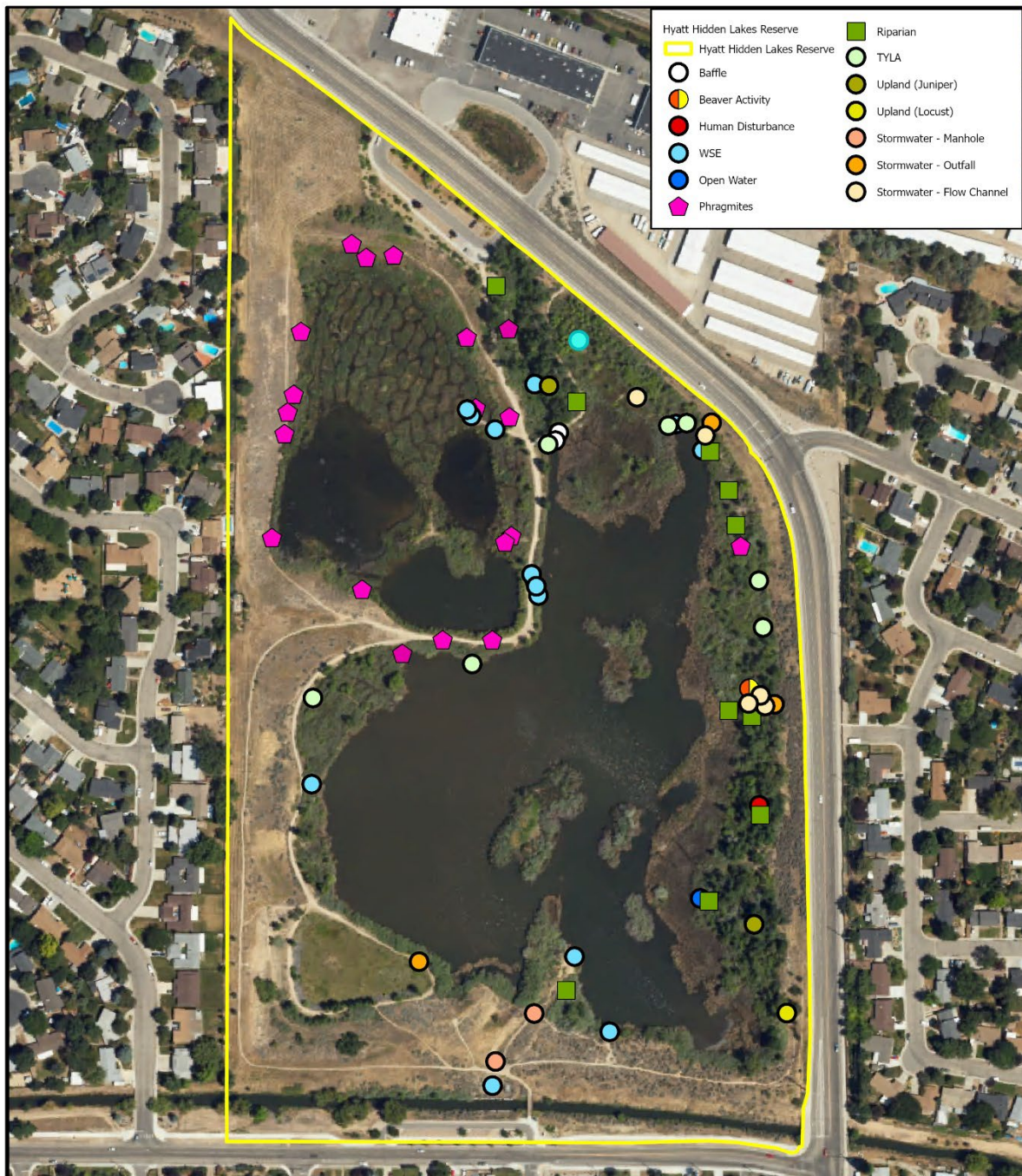
Ecosystem Sciences employed several different analyses to document current conditions at Hyatt Hidden Lakes Reserve. The analysis focused on:

1. Mapping and documenting the current condition of the wetlands at the Reserve through field visits including wetland mapping and documenting the location and abundance of phragmites.
2. Examination of historical changes through time (10 years) via remote sensing to understand the wetland extent and seasonal hydrology
3. Gathering hydrology and elevation data, including current Water Surface Elevations (WSE) and the elevation of important infrastructure through topographic survey (compliments of the City of Boise)

Much of the analysis was focused on water surface elevation fluctuations over time, as hydrology drives wetland function. The project was designed to maintain a consistent water level in the wetland complex. Hyatt Dam is the WSE regulating structure in the Reserve. While Hyatt Dam's outlet structure has remained static since construction, water levels within the Reserve have not. There is a lack of data regarding annual inflow (e.g., volume of water diverted to Hyatt Lakes from Settler's Canal) to Hyatt Hidden Lakes and no data on the outflow (e.g., water flowing through Hyatt Dam) from Hyatt Hidden Lakes. The water surface elevation of the various ponds and wetland cells have not been monitored and recorded consistently. This lack of consistent hydrology data coupled with known maintenance issues (e.g., baffle cleaning/baffle damage), and it is understandably hard to quantify the hydrology regime at Hyatt Hidden Lakes. In an attempt to better understand the hydrology of the site and the ability of Hyatt Dam to provide the necessary wetland hydrology to the site several analyses were employed. The result of these analyses identifies that varying WSE changes over time have caused, or exacerbated, maintenance and invasive species establishment.

3.1.1 Field Examination

Ecosystem Sciences personnel visited Hyatt Hidden Lakes on several occasions in late summer/early fall of 2024. The focus of the field work was to document current wetland extent and types (e.g., PEM, PSS, etc.), identify open water extent, locate stormwater infrastructure, document the location and extent of Phragmites and locate important infrastructure for water movement through the Hyatt Hidden Lakes. Figure 5 below documents the field work. Ecosystem Sciences traversed the property taking points using an ArcGIS Online Field Maps Application. The points collected in the field assisted Ecosystem Sciences in determining "Likely Wetlands" at the site and document the extent and location of *Phragmites* invasion.



Hyatt Hidden Lakes Reserve

Field Data Collection

0 250 500
Feet



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Figure 5. Field Data Collection Points.

3.1.2 NDVI (Historical Wetland Analysis)

Ecosystem Sciences employed a remote sensing vegetation index named Normalized Vegetation Difference Index (NDVI), to determine vigorous vegetation (aka water dependent) and permanent open water areas of Hyatt Hidden Lakes through time (2013 to 2023). National Agriculture Imagery Program images were used to derive the NDVI. NDVI quantifies vegetation by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs), creating an index that ranges from -1 to +1 (Figure 6). Negative NDVI values, closer to -1, indicate an area is likely water. Positive NDVI values, closer to +1 are indicative of dense green leaves often associated with vigorous growth (Figure 6). Ecosystem Sciences created an NDVI layer for each NAIP image year (e.g., 2013, 2015, 2017, 2019, 2021 and 2023). Ecosystem Sciences selected NDVI values that were one standard deviation below the mean as water (close to -1). NDVI values that were one standard deviation above the mean (close to +1) were selected as vigorous vegetation. Vigorous vegetation, in this context, is generally water-dependent (riparian or wetland) species or agriculture. Most of the vigorous vegetation identified through this analysis are riparian species (e.g., trees and shrubs), or grasses and forbs near perennial water bodies (e.g., adjacent to “lakes or streams”). The focus of the NDVI analysis is to document Open Water and Vigorous Vegetation changes over a 10-year period. The NDVI analysis identified areas that were permanently flooded over the 10-year period and areas that were occasionally flooded over that time (Figure 7, Blue = permanently flooded, Red = occasionally flooded). The red areas, in Figure 7, are indicative of fluctuating WSE in Hyatt Hidden Lakes. WSE fluctuations may be one cause of “wetland clumps” dislodging from streambanks, or where they are rooted and floating downstream to clog the baffle. When broken down into a more granular output (not 2 classes, but six classes – Figure 8) – we can see that the northwest area of the constructed wetlands is only inundated infrequently. Additionally, the infrequent flooding (Figure 8) of the Northwest corner of Hyatt Hidden Lakes wetland complex may be problematic and a potential cause of phragmites invasion/failure to develop shrub wetlands.

Figure 9 below presents the Vigorous Vegetation results of the NDVI analysis. The green areas of Figure 9 are indicative of permanent vegetation that was consistent over the analysis timeframe. These green areas are primarily tree and shrub dominated areas, that are most likely Riparian Vegetation. The red areas, in Figure 9, depict inconsistent “Vigorous Vegetation” indicating that these areas were variable over the analysis window, sometimes high NDVI values (>0.5) and other times lower (<0.5). These areas depict potential wetland vegetation or near-wetland vegetation, that responded to WSE fluctuations with varying brightness values in the imagery. The red areas in Figure 9, were the focus of the “Likely Wetlands” mapping and as areas to search for phragmites.

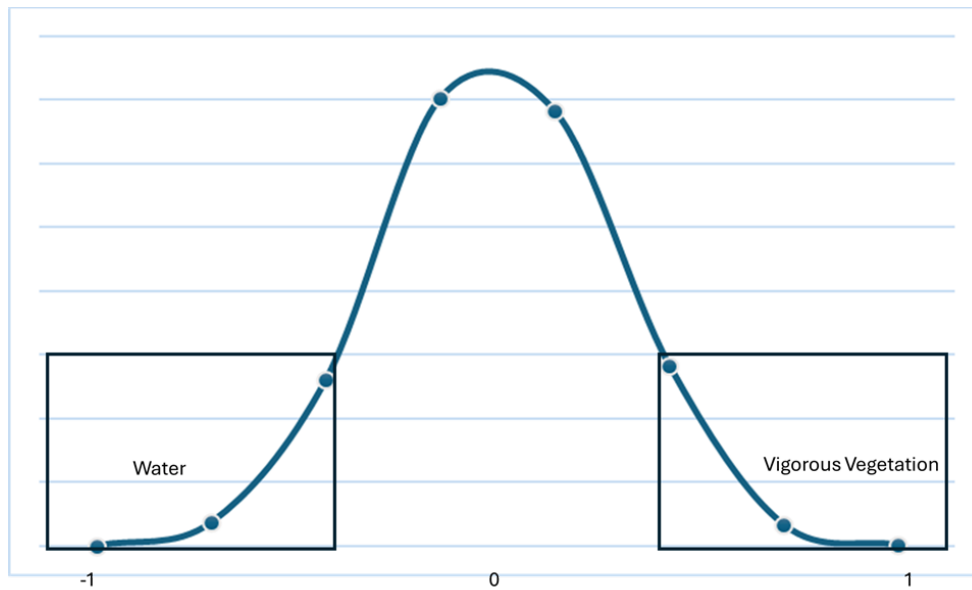


Figure 6. NDVI Analysis Results – Hypothetical NDVI Distribution.



Figure 7. NDVI Results Permanently Flood and Flucuation Zone.

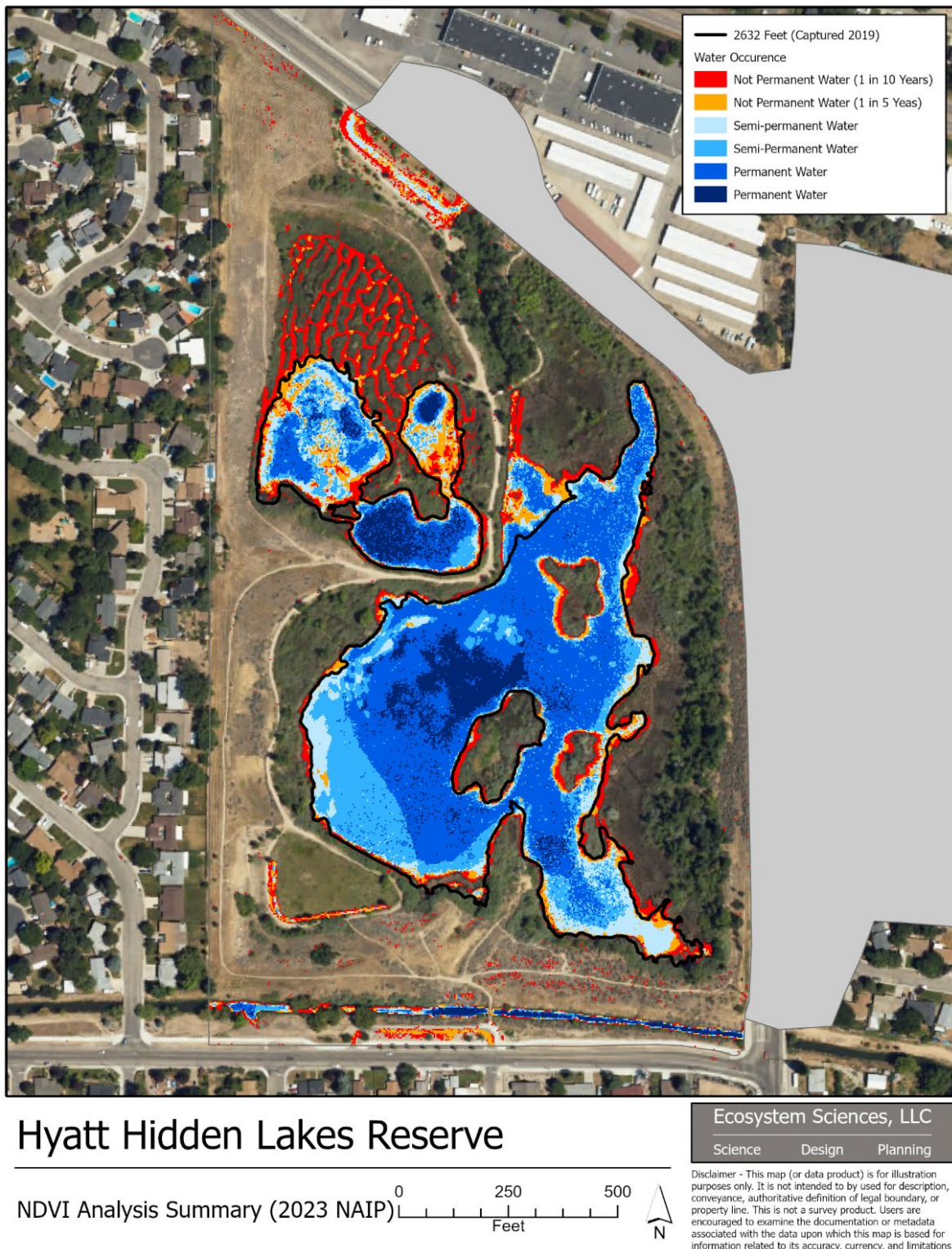
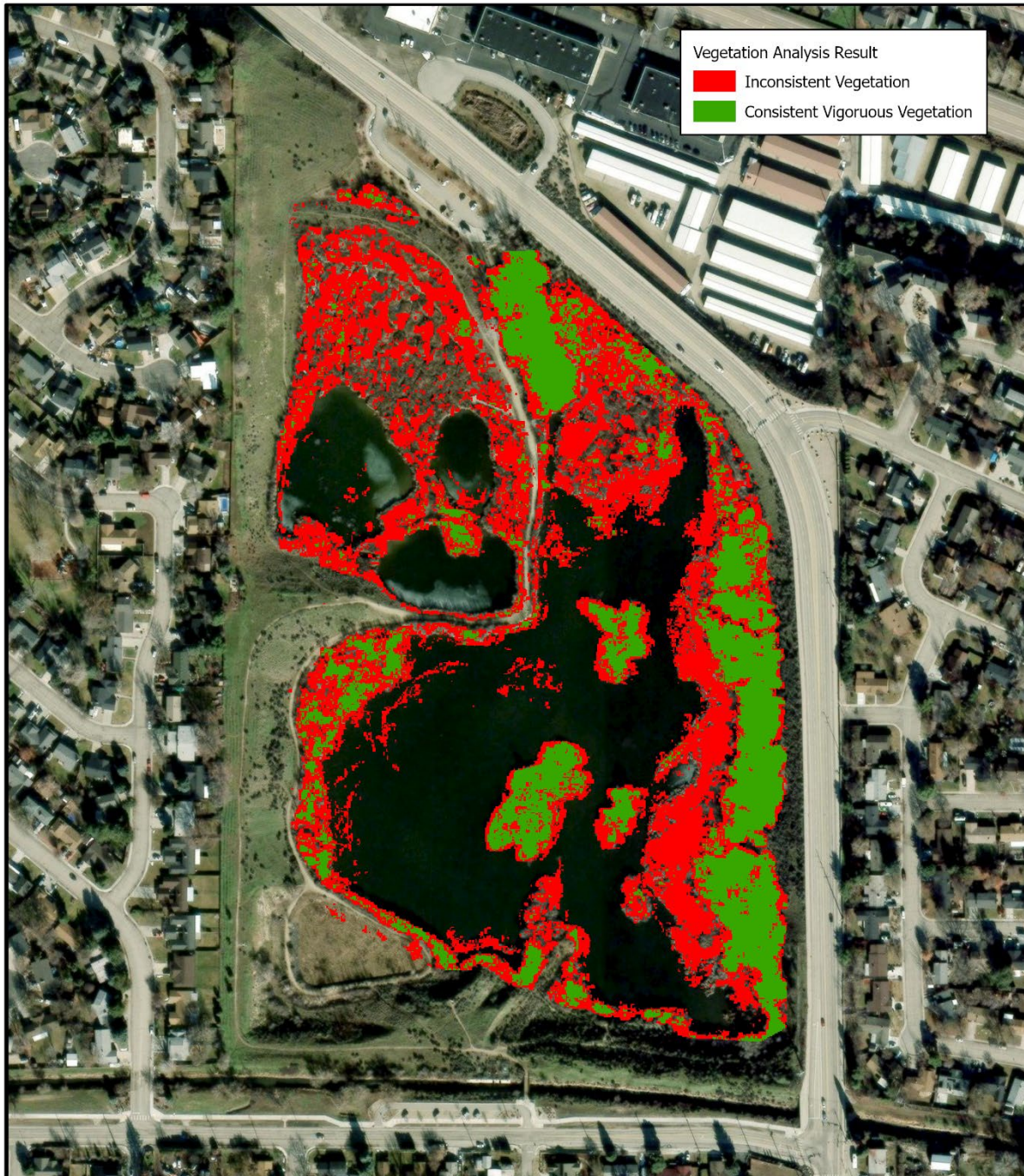


Figure 8. Frequency of inundation broken into six classes from permanently flooded to approximately once in 10 years. The dam elevation and design WSE is outlined in black.



Hyatt Hidden Lakes Reserve

Vegetation NDVI Results



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Figure 9. NDVI Results Consistent Vigorus Vegetation vs. Inconsistent Vigorous Vegetation.

3.1.3 Topographic Survey Fall of 2024

The City of Boise’s survey crew met Ecosystem Sciences at Hyatt Hidden lakes Reserve on September 27th, 2024. The survey crew took elevations at 54 points throughout Hyatt Hidden Lakes (Figure 10). Of the 54 points collected, 42 were paired points that collected a water surface elevation (21 WSE points) with a corresponding high-water mark (21 HWM points). Ecosystem Sciences and the survey crew determined the high-water mark point collection area together, looking for signs that identified the high-water mark (vegetation indicator, soil moisture indicator, or most often a distinct line). An additional 5 Water Surface Elevation points were collected, that were not paired with a High-Water Mark point (Table 1). Table 1 below documents the results of the topographic survey, by summarizing the WSE points and high-water mark points, and the differences between them. In general, the topographic survey further strengthens the belief water surface elevation within the Reserve fluctuates. In general, mean water surface elevation varied by roughly 0.7ft.

Table 1. Topographic Survey Results/Summarization

	N	Min	Max	Mean
HWM	21	2632.6	2633.9	2633.2
WSE	26	2632.3	2633.2	2632.6
	Difference	0.3	0.7	0.7

Two important results of the topographic survey were the Hyatt Dam outlet elevation, which was 2,632.047 feet, and the water surface elevation of the water flowing over the outlet, which was 2,632.465. Roughly 0.42 feet in difference, representing the depth of the water going over the dam at the notch. The inundation area, or extent, within Hyatt Hidden Lakes from a WSE of 2,632.465 at Hyatt Dam is shown in Figure 11. Notably, portions of the northwest corner of the Hyatt Hidden Lakes wetland complex are inundated at this WSE. The data show that the dam was built to the correct elevation and water levels are above the notch in the dam seasonally, generally between 2,632 and 2,633. We assume the water level drops below the dam crest during the low water season – presumably October thru spring when there is no inflow from the canal.



Hyatt Hidden Lakes Reserve

Topographic Survey Results



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Figure 10. Topographic Survey Results (City of Boise Survey Crew).



Figure 11. Inundation Extent at WSE 2,632.465 ft (Hyatt Dam).

3.1.4 Topographic Survey 2025 (March)

The City of Boise re-surveyed the Hyatt Hidden Lakes in March of 2025. The impetus for the re-survey was field evaluations noted that the water surface elevation (WSE) for the ponds in the northwest corner of the reserve was very low (Figure 3). City of Boise resurveyed the site and took “water line” measurements in March 2025. “Water line” simply differentiates WSE elevations from 2024 and 2025, where water line depicts the low values in 2025. Tables 2 and 3 provide the results of the survey. Table 2 indicates that water surface elevations (WSE) in the largest ponds at the reserve maintained a consistent elevation between September 2024 and March 2025. Although, the maximum WSE in March was ½ foot lower than the September measurements, the overall mean WSE remained relatively constant (0.1ft decrease, Table 2).

Table 2. September 2024 and March 2025 WSE Topographic Survey Comparison

	N	Min	Max	Mean
Sept.'24 WSE	12	2,632.4	2,633.2	2,632.7
Mar.'25 WL	8	2,632.4	2,632.7	2,632.6
	Difference	0.0	0.5	0.1

Conversely, the ponds in the northwest corner of the reserve did not maintain a consistent WSE. Water line measurements in March of 2025, were significantly lower than in September of 2024 (Table 3). The minimum water line was 2.4 feet below the fall of 2024 measurement, the maximum WSE was 1.1ft below 2024, and on average (aka mean) the water surface in the northwest ponds was 1.5 feet lower than in September of 2025. This data indicates that ponds in the northwest corner of the site experience a dry period frequently (likely annually). The construction documents and the Hyatt Wetlands Mitigation Bank documentation (Wetlands Group 2012) do not include an annual dry period for these ponds. Rather, the documentation indicates that these ponds should maintain a consistent WSE throughout the year.

Table 3. September 2024 and March 2025 WSE Topographic Survey Compare NW Ponds

	N	Min	Max	Mean
Sept. '24 WSE	12	2,632.4	2,632.7	2,632.5
Mar.'25 WL	7	2,630.0	2,631.6	2,631.0
	Difference	2.4	1.1	1.5

The drying up, or water surface elevation reductions, in the northwest ponds appears to occur on a regular basis. A review of Google Earth Imagery and other image sources (Compass 2016 Leaf-Off, Figure 3) indicates that the northwest ponds have dried up several times since project inception including 2015, 2016, 2020, 2021, 2024, and again in 2025. The drying up of the northwest ponds may contribute to the spread of phragmites in this area as documented later in this report. It also demonstrates the importance of collaboration between the City and SID. The City must know when water is being turned on and turned off, so that they can manage the Hyatt Dam to ensure water surface elevations are maintained throughout the reserve.

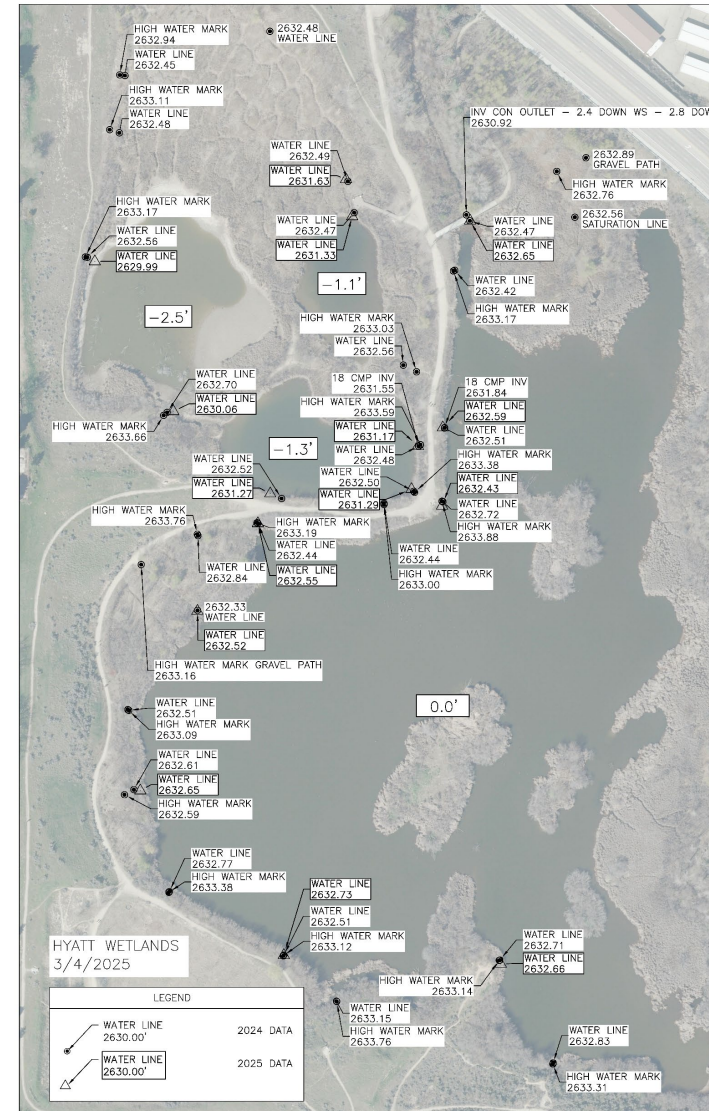


Figure 10. Northwest Cells Drying 2016 and 2025.

4 VEGETATION AND WETLAND ANALYSIS

The field examination, NDVI analysis, and topographic survey provided significant data in which to develop a “likely wetland” map for Hyatt Hidden Lakes, identify phragmites locations and infestations areas, and develop management recommendations for long-term maintenance of Hyatt Hidden Lakes.

The major issue noted through the field work, NDVI analysis, topographic survey and discussions with City of Boise is that WSE fluctuations may be impacting wetland extent and function at Hyatt Hidden Lakes. The primary maintenance issue is blockages caused by excess vegetation debris drifting to the baffle (outlet structure), causing water surface elevations to rise upstream of the outlet structure. The increased water levels, higher than designed conditions, inundate areas up to 2,633 or higher. (e.g., banks or adjacent floodplains). Inundating landforms that, at project design, were expected to support shrub/scrub or forested vegetation. When the baffle is cleared the water level drops quickly and may cause established emergent vegetation to slough off into the open water. These emergent vegetation clumps flow towards and clog the baffle, thus causing maintenance issues to re-occur. This process is confounded by a dearth of inflow data to the Hyatt Hidden lakes, whether that be from dedicated flow from Settlers’ canal or stormwater runoff. Not knowing the volume or timing of inflows to the Hyatt Hidden Lakes makes it difficult to manage for a desired water surface elevation. These issues lead to frequent maintenance needs.

4.1 CURRENT LIKELY WETLAND MAP (NOT A DELINEATION)

Ecosystem Sciences delineated the boundaries of wetland types in ESRI’s ArcGIS Professional (ArcPro) Geographic Information System (GIS) application using heads-up digitizing. Field data, NDVI vegetation vigor results (e.g., dense vegetation) and topographic data enabled Ecosystem Science personnel to delineate “likely wetland types” (Figure 10, Table 4). This is not a wetland delineation, and upland “non-wetland” types are not mapped.

Table 4. Current Conditions – “Likely Wetlands”

Type (Code)	Name	Acres
PEM	Palustrine Emergent	8.1
PSS	Palustrine Scrub Shrub	5.0
PFO	Palustrine Forested	0.8
PUB	Palustrine Unconsolidated Bottom	14.1
RUB	Riverine Unconsolidated Bottom	0.1
	Total	28.1

A total of 13.9 acres of vegetated wetland was mapped at Hyatt Hidden Lakes. This acreage is divided into three classes: Palustrine Emergent (PEM - 8.1 acres), Palustrine Scrub Shrub (PSS 5.0 acres) and Palustrine Forested (PFO – 0.8 acres) (Table 2). Two “open water” wetland types

account for the remaining 14.2 acres of “likely wetland”: Palustrine Unconsolidated Bottom (PUB - 14.1 acres), and Riverine Unconsolidated Bottom (RUB – 0.1 acres) (Table 4).

4.1.1 Current Likely Wetlands Constructed Area (Northwest Ponds)

The original constructed wetland design plan for Hyatt Hidden Lakes called for the creation of 7.09 acres of varying wetland types (Table 5, “Expected Acres”). The constructed wetlands occur in the northwest corner of the Hyatt Hidden Lakes complex. The constructed wetland types were distributed between PEM, PSS and PFO (Wetlands Group 2012) (Table 5). Currently, the constructed portion of Hyatt Hidden Lakes houses 3.3 acres of PEM, 0.7 acres of PSS and 0 acres of PFO (Table 5, Figure 11). In short, the wetland types in the constructed portion of Hyatt Hidden Lakes do not meet expected acreages. Water Surface Elevation within the Hyatt Hidden Lakes complex has a significant impact on wetland types that occur today. The extent of PEM in constructed wetland is over twice what was expected. This may be indicative of fluctuating water surface elevations over time.

Table 5. Current Conditions - 2024 Mapped Likely Wetlands v. Expected Wetlands

Type (Code)	Name	2024 Acres	Expected Acres
PEM	Palustrine Emergent	3.3	1.39
PSS	Palustrine Scrub Shrub	0.7	2.97
PFO	Palustrine Forested	0	2.73
PUB	Palustrine unconsolidated Bottom	2.7	0
RUB	Riverine Unconsolidated Bottom	0	0
Total		6.7	7.09



Figure 11. Likely Wetlands at Hyatt Hidden Lakes (2024).

It has been over a decade since the construction of the wetland complex at Hyatt Hidden Lakes Reserve. The current condition does not meet the original design goals, specifically there is less woody wetland (especially shrub-scrub wetland) than the project's design intended and the invasion and spread of a non-native giant reed (see section 4.2 below) may impact future habitat value of the preserve. The remainder of this document focuses on the current condition of the reserve, the factors that may be affecting the ecosystem function, and potential actions (including maintenance) that may change the ecosystem trajectory towards meeting the intended goals.

4.2 PHRAGMITES DISTRIBUTION

The extent of invasive reed (*Phragmites*) infestation was mapped. The results indicate significant encroachment in key areas, highlighting the need for management to control its spread and mitigate its ecological impact. Figure 11 documents the areas of Hyatt Hidden Lakes where *Phragmites* is dominant and where it is present. The constructed wetland area, northwest portion of the Reserve, has suffered from significant *Phragmites* infestation. Field assessment indicates that the ground surface elevation of this area (e.g., wetland bank) may be constructed too high to sustain the desired hydrological and ecological conditions. The site did not meet the criteria for palustrine scrub-shrub (PSS) or palustrine forested (PFO) wetland types and thus was classified as PEM. Field and topographic data indicated that water levels in the Reserve's wetland complex have decreased by almost one foot compared to earlier in the year (e.g., see high-water mark analysis). This decline is most likely the result of maintenance activities at the Baffle, but seasonal variation or external hydrological influences (e.g., stormwater inflows) may also contribute. Significant intervention is needed to control the spread and reduce the extent of *Phragmites* at Hyatt Hidden Lakes, the next section details some recommendations for future management.

4.3 FLOATING VEGETATION DEBRIS

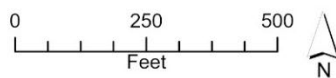
A central concern of the City is that vegetation floats down the main lake and clogs the baffle, requiring maintenance. Although some vegetation will always float within the waterway, we identified potential causes and mitigation actions:

- Rapidly fluctuating water levels can cause vegetation balls to slump off. Maintaining a consistent WSE could potentially reduce the volume of vegetation sloughing off.
- Beaver and muskrat activity can weaken and dislodge vegetation clumps, and they tunnel and burrow into root wads, weakening them. They also could build dams within the Reserve, creating more debris and other management considerations. A survey for beaver and muskrat is recommended.



Hyatt Hidden Lakes Reserve

Phragmites Distribution/Presence



Ecosystem Sciences, LLC

Science Design Planning

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Figure 12. *Phragmites* extent and location within Hyatt Hidden Lakes.

5 MANAGEMENT AND RECOMMENDATIONS

Based on the available information, we present the following recommendations:

1. Monitor inflow and outflow to/from Hyatt Hidden Lakes and WSE through an automated system to understand the hydrology of the reserve. A device that monitors the WSE (e.g. pressure transducer) would be a cost-effective tool. A complex outlet gate would be a more expensive but a functional change.
2. Consider modifications of Hyatt Dam outlet structure to control/maintain WSE elevations.
3. Consider a beaver management strategy– they likely contribute to debris floating to Hyatt Dam.
4. Invasive Species Management: *phragmites* invaded the northwest ponds. An eradication and control program will move the reserve to a more native trajectory.
5. Improve conveyance to the northwest ponds. Consider lowering ground surface elevation in northwest wetland area, as it was not constructed to designed elevation. This overlaps with the *phragmites* treatment area. Consider excavating trenches that connect ponds and wetland to move more water in a northwesterly direction. A second culvert from the main area may be useful.

We have included further discussion on these recommendations below. The order of the issues is important, as maintaining a consistent WSE is vital to future management, and how the wetland complex was designed. However, we do not believe the wetland was constructed to designed ground surface elevations, so management of hydrology or ground surface elevations should be re-evaluated. The data collection and analysis provided herein indicates that WSE fluctuations at Hyatt Dam may have contributed to problems upstream (e.g., contributing to the erosion of wetland vegetation, or elevated water surfaces impacting vegetation type establishment). Field data indicated that recent WSE fluctuation in the wetland complex was nearly 1ft (Topographic Data Collection), with the WSE in the northwest ponds to be 2.5 ft below the main pond. In short, the system is not equalizing the WSE to the designed water surface elevation.

5.1 MONITOR INFLOW/OUTFLOW AND WSE (UNDERSTAND HYDROLOGY)

Settler's Irrigation District (SID) owns, operates, and maintains the flow augmentation spillway structure from their canal to Hyatt Hidden Lakes. Discharge into the Hyatt wetland from Settler's canal is limited to 20 cubic feet per second over a 24-hour period. This release of water is exclusive to discharges of City water rights from the Hyatt wetlands. The project documentation states that, "in no case shall discharges be allowed to exceed the maximum allowed water surface elevation of 2632.00." Project research (e.g., Topographic Data Collection) and personnel communications (e.g., maintenance issues) from the City of Boise indicate that the WSE at Hyatt Hidden Lakes has exceeded 2632.0 ft in elevation often, leading to the conditions being addressed in this report. Overall, the most important aspect of the project is for the City of Boise to know when flows are being released to the Hyatt Hidden Lakes and what the WSE is in the ponds including the northwest ponds. Coordination between SID and City of Boise is paramount to proper wetland function. The City of Boise must know when flows are being released to the wetland, so that they can plan for maintenance. Having personnel available to perform maintenance during the inflow period would alleviate many of the issues with maintaining a constant water level at the Hyatt Hidden lakes.

Even more important to inflow and outflow is monitoring and managing the WSE in each of the ponds and wetland areas. In an ideal situation, the city would have a pressure transducer in the main lake and in the northwest ponds that are linked to a cell network and available on a desktop through the internet. A manager could check the WSE in real time as well as the inflow and outflow. This would entail a few pressure transducers that would communicate with one cell uplink site. We can recommend contractors who can install a system that would provide this functionality. A simpler option is to send the survey crew monthly or bi-monthly to repeat the elevation points as part of this investigation. Check to ensure water surface elevation within the reserve are constant.

If actions in section 5.5 below are not undertaken, holding the WSE at a higher elevation for a longer period may be a good solution to the issues with the northwest ponds. A more complicated and expensive solution would be retrofitting the dam with a more complex outlet gate that controls both WSE and releases from the dam. This would be more of an engineering exercise best performed by others.

5.2 HYATT DAM, VEGETATION AND BAFFLE/DEBRIS MANAGEMENT (MAINTAIN WSE, REDUCE MAINTENANCE COST)

The City of Boise has spent considerable resources maintaining the Water Surface Elevation at Hyatt Dam. This effort includes consistent maintenance focused on removing debris from in front of the Dam's baffle. The city of Boise has also replaced the original Baffle as it was damaged during maintenance activities to remove debris. The new baffle is currently in place and functioning, but the City of Boise continues to perform consistent (weekly) maintenance to maintain flow through Hyatt Dam.

5.2.1 Hyatt Dam and Floating Debris and Baffle management Recommendations

Monitoring the baffle is paramount to the proper functioning of Hyatt Dam. Monitoring can be performed through a trail camera focused on Hyatt Dam, which allows City of Boise Managers to visually determine maintenance needs, or daily/weekly interventions. Having a City of Boise employee visually inspect the baffle daily or weekly and provide maintenance activities as needed is an option. That option entails significant manpower resource investment from the City. However, subsequent sections of this discovery report provide information on understanding the inflow to the Hyatt Hidden Lakes. Understanding the timing and volume of inflows is paramount to providing quality maintenance, as the City will be able to respond to potential maintenance issues based on inflow timing rather than daily. Being onsite when settlers canal is releasing to the site and responding to storms (stormwater inflow) will be important for the City to maintain a proper water level at Hyatt Dam.

A second option is a more capital intensive but will save labor in the long term. There are automated systems that use trash rakes, floating booms, rotating intake heads and debris conveyors. These systems can be fully autonomous. They likely have a high capital investment cost, but lower ongoing maintenance and labor (e.g. Aquarius-Systems -TrashVeyor; Atlas Polar - Trash Rake and Stoplog Systems; Atlas SSI – Landy Trash Rake). These companies are just examples, but they provide free estimates and have many sizes and a variety of approaches.

5.3 BEAVER MANAGEMENT

The City and IDFG have engaged in beaver management at Hyatt Hidden Lakes in the Past. Although beaver are great for ecosystems, they can be a challenge in highly managed systems. Consultation with IDFG indicates that there have been several beaver issues at the reserve. The Settler's canal is a high use area for the beavers, so their presence in the reserve will be an ongoing issue. The City should investigate beaver deterrent strategies that might be suitable for this site. Managing water levels, eliminating Beaver runways, installing fencing and wire mesh, electronic fencing, the use of repellents (e.g. paint and sand mixture, cayenne pepper oil, castor, etc.), or trapping and relocating. Consultation with IDFG and drafting a beaver management plan could be beneficial.

5.4 INVASIVE SPECIES MANAGEMENT (MAINLY *PHRAGMITES*)

Phragmites has invaded many wetlands in the pacific northwest, both natural and artificial. It presents a challenge to wetland managers. At Hyatt, the invasion has already spread to much of the northwest pond area. Immediate action is needed to prevent its spread to the rest of the area. We believe an intense irradiation effort, followed by a monitoring and management effort are required. This effort may be in conjunction with WSE management and recontouring of the ground surface in the area, primarily the northwest ponds area.

To effectively eliminate *Phragmites australis* in a reservoir area, a comprehensive and integrated management approach is recommended. Initial efforts should focus on reducing the plant's vigor and spread through a combination of herbicide applications and mechanical removal. Herbicides such as glyphosate or imazapyr, approved for use in aquatic environments, can be applied during the late summer or early fall when Phragmites is actively transporting nutrients to its roots. This method ensures maximum impact on the rhizome system. Following herbicide treatment, mechanical removal, such as mowing or cutting, should be conducted after the plants have browned to reduce standing biomass and facilitate native plant reestablishment.

Long-term management is essential to prevent reinfestation. Regular monitoring of the reservoir area for new growth is critical, as is promptly addressing any regrowth with targeted treatments. Encouraging the reestablishment of native vegetation through reseeding or planting can create competition for resources and help stabilize the habitat. Engaging in public education about the impacts of Phragmites and ensuring compliance with best practices for control in adjacent areas will further bolster the effectiveness of these efforts. Combining these strategies will help restore the ecological balance of the reservoir and prevent the spread of this invasive species.

The proliferation of invasive reed (Phragmites spp.) presents significant ecological challenges that persist beyond project completion. Near-monotypic stands of this aggressive grass have replaced high-quality, diverse communities of native plants, including sedges, rushes, and cattails. This shift has resulted in a substantial reduction in plant and wildlife habitat diversity, leading to losses in food sources and shelter for native fauna. Additionally, Phragmites alters the wetland water regime by accelerating evaporation and trapping sediments, contributing to the "drying" of marsh soils and further degrading wetland functionality. The buildup of dry biomass during the dormant season also creates a serious fire hazard. Effective long-term management will be essential to control Phragmites, restore native vegetation, and prevent these ecological disruptions from undermining the reserve's restoration goals.

We recommend an intense eradication effort by a contractor to cut and remove large areas of *Phragmites*. If ground surface recontouring recommended in 5.5 are employed, these could be done conjunctively. Following the intense effort, mulching, post treatment management and water surface elevation management are recommended. The Nature Conservancy's element Stewardship Abstract is a great resource with case studies and review of management options.

(<https://www.invasive.org/gist/esadocs/documnts/phraaus.pdf>)

5.5 IMPROVE CONVEYANCE TO NW PONDS

From the information gathered in this report, we do not feel the northwest ponds and associated wetlands are functioning as designed due to multipole factors:

1. They were constructed above their designed ground surface elevations.
2. They are not equalizing with the main pond WSE in lower water conditions (see survey report where WSE is >2 ft below the main pond in this area).
3. WSE management at the Hyatt dam has not been optimized.

The third issue is addressed above (section 5.2). The first two bullets above involve moving earth and creating disturbance. These are expensive actions that include risk of creating an environment for invasive species to fill. However, if the intense *Phragmites* treatment is undertaken, there will be considerable vegetation and soil disturbance, so the risks associated with lowering ground surfaces will be reduced. Lowering ground surfaces to or below the designed elevations (2,630-2,631.5 Figure 12) will increase the hydroperiod and reduce the current drying cycle.

Not only were sections of the NW ponds and wetlands not constructed to their designed elevation, but conveyance is not sufficient. As evidenced by the recent WSE surveys, water is not conveying from the main pond to the northwest ponds. Although design drawings indicate that two culverts allow water to move into the northwest ponds, surveys have only located one culvert. An additional culvert may be helpful in equalizing the WSE between the main pond and the northwest ponds.

Conveyance to the northwest wetland area could also be improved by lowering the ground surface to connect the NW ponds at lower WSE. The three NW ponds were at three WSE and varied by up to 2 feet from each other – this means at lower WSE, they are only connected by subsurface flow. Creating or restoring a surface connection at a lower WSE will help to maintain the aesthetics of the full pond and wetland hydrology to more of the site. This could be considered akin to ditch maintenance – deposition of organic matter and sediment reduce conveyance. Removing material from the connections between the ponds may increase the equalization of WSE throughout the system. This could alleviate some of the drying of the northwest wetlands as well.



Figure 12. Areas of the Reserve below 2,632 in elevation are shown in red.