# City of New Braunfels

# 2027 EAHCP Work Plan

## 2027 City of New Braunfels Work Plan Budget

| EAHCP Section | Conservation Measure | Table 7.1 | Estimated 2027 Budget |
|---|---|---|---|
| 5.2.1 | Flow Split Management | $0 | $0 |
| 5.2.2.1/ 5.2.2.3 | Old Channel Aquatic Vegetation Restoration & Maintenance | $10,000 | $50,000 |
| 5.2.2.2/ 5.2.2.3 | Landa Lake/ Comal River Aquatic Vegetation Restoration & Maintenance | $50,000 | $100,000 |
| 5.2.3 | Management of Public Recreation | $0 | $0 |
| 5.2.4 | Decaying Vegetation Removal and Dissolved Oxygen Management | $15,000 | $15,000 |
| 5.2.5/5.2.9 | Non-Native Animal Species Control | $75,000 | $40,000 |
| 5.2.6/ 6.3.6 | Monitoring and Reduction of Gill Parasites | $75,000 | $10,000 |
| 5.2.7 | Prohibition of Hazardous Material Transport Routes | $0 | $0 |
| 5.2.8 | Native Riparian Habitat Restoration (Riffle Beetle) | $25,000 | $50,000 |
| 5.2.10 | Litter and Floating Vegetation Management | $0 | $40,000 |
| 5.2.11 | Golf Course Management | $0 | $0 |
| 5.7.1 | Native Riparian Habitat Restoration | $100,000 | $50,000 |
| 5.7.5 | Management of Household Hazardous Waste | $30,000 | $40,385 |
| 5.7.6 | Impervious Cover/ Water Quality Protection | $100,000 | $55,000 |
| | **Totals** | **$570,000** | **$450,385** |

## 2027 City of New Braunfels Work Plan and Funding Application Amendments

| Amendment # | Date EAHCP Committee Approved | Conservation Measure Amended | Y/N Funding Application Change | Funding Application Change ($) | Date EAA Board Approved | Comments |
|---|---|---|---|---|---|---|
| 0 | 6/4/2026 | Original 2027 Work Plan | NA | NA | NA | Original 2027 Work Plan |
| 0 | 10/08/2026 | Original 2027 Funding Application | NA | NA | 11/10/2026 | Original 2027 Funding Application |
| 1 | 10/08/2026 | Riparian Restoration and Water Quality Protection | NA | NA | NA | Updated Work Plan with revised program activities and budget for Riparian Restoration and Impervious Cover/Water Quality Protection |

### 5.2.1 Flow Split Management

**Long-term Objective:**
To sustain flow rates in the Old Channel of the Comal River that complement Old Channel aquatic vegetation restoration efforts, minimize channel scouring, and maximize the quality of fountain darter habitat.

**Target for 2027:**
Maintain flow rates in the Old and New Channels of the Comal River to meet objectives specified in the revised Table 5-3 of the EAHCP (**Table 1**).

Priority will be given to achieving target flow rates in the Old Channel and, secondly, to flow rates in the New Channel. City of New Braunfels staff will monitor streamflow conditions via USGS streamflow gages and operate the flow-control gates between Landa Lake and the Old Channel to achieve flow targets. Maintenance activities associated with the flow-control gates will be conducted as needed to ensure continued operability.

**Table 1.** EAHCP Table 5-3 (revised)

| Total Comal Springflow (cfs) | Old Channel (cfs) | | New Channel (cfs) | |
|---|---|---|---|---|
| | Fall, Winter | Spring, Summer | Fall, Winter | Spring, Summer |
| 350+ | 65 | 60 | 280+ | 290+ |
| 300 | 65 | 60 | 235 | 240 |
| 250 | 60 | 55 | 190 | 195 |
| 200 | 60 | 55 | 140 | 145 |
| 150 | 55 | | 95 | |
| 100 | 50 | | 50 | |
| 80 | 45 | | 35 | |
| 70 | 40 | | 30 | |
| 60 | 35-40 | | 25 | |
| 50 | 35-40 | | 15 | |
| 40 | 30 | | 10 | |
| 30 | 20 | | 10 | |

**Methodology:**
The City of New Braunfels will manage the flow-split program according to flow rates specified in revised Table 5-3 (**Table 1**). A standard operating procedure has been developed by the City of New Braunfels to guide adjustments to the flow-control gates and to achieve flow-split targets. City of New Braunfels staff will monitor real-time streamflow conditions at USGS gages in the Comal River system and adjust the flow-control gates, as needed, to meet flow-split streamflow targets. The primary 48" culvert gate and the back-up culvert gates will be operated conjunctively to meet target flow rates. Floating vegetation and debris will be manually removed from the flow control gate and screen, as needed, to prevent blockages and flow restrictions. Vegetative material removed from the intake structure will be placed along the banks of Landa Lake and/ or returned to Landa

Lake. Floating vegetation is managed and funded under task of EAHCP § 5.2.10: Litter and Floating Vegetation Management. The flow control gates will be exercised routinely to maintain functionality of the gate.

**Monitoring:**
Monitoring of flow rates in the Old Channel, New Channel, and Comal River will be based on real-time streamflow data provided by the USGS gages in the Comal River. City of New Braunfels staff will monitor streamflow on a weekly basis, at minimum. Adjustments to the flow-control gate will be made on an as-needed basis to meet flow-spilt management objectives. City of New Braunfels staff will monitor the flow-control gate and intake screen on a regular basis to assess for vegetation build-up and debris that have the potential to restrict flow into the culvert between Landa Lake and the Old Channel.

**Budget:**
Table 7.1:
$0

Estimated 2027 budget:
$0

### 5.2.2.1/ 5.2.2.3 Old Channel Aquatic Vegetation Restoration and Maintenance

**Long-term Objective:**
To achieve native submerged aquatic vegetation (SAV) coverage goals for the Old Channel Long-Term Biological Goal (LTBG) and Old Channel Environmental Restoration & Protection Area (ERPA) reaches as set forth in the revised EAHCP tables 4.1 and 4.1.1, respectively. The overall intent of the aquatic vegetation restoration program is to increase and preserve the coverage of high-quality habitat for the fountain darter (*Etheostoma fonticola*).

**Target for 2027:**

SAV restoration efforts in 2027 will include the planting and maintenance of target SAV species. **Figure 1** depicts the Comal River system and identifies individual Old Channel restoration reaches. SAV restoration goals for 2027, as well as the EAHCP long-term SAV coverage goals, for the Old Channel LTBG and ERPA reaches are specified by reach and vegetation type in **Table 2**. **Figure 2** details an additional buffer area in addition to the existing LTBG reaches where nonnative species will be removed to reduce the chance of nonnative species encroachment into the restoration and LTBG reaches. Efforts will also be made in 2027 to monitor for and remove re-emergent non-native *Hygrophila* from the Old Channel LTBG and ERPA reaches.

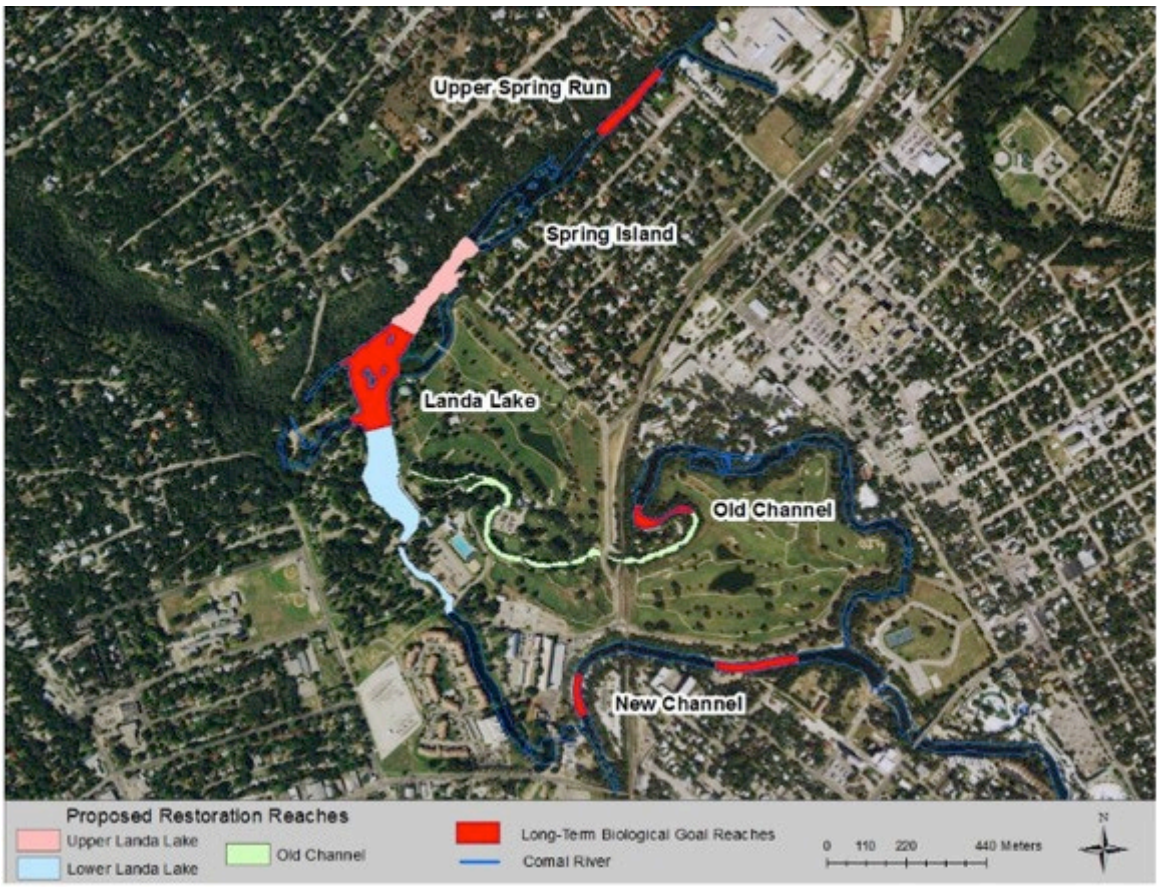



**Figure 1:** LTBG and restoration reaches for the Comal River System. The Old Channel ERPA restoration reach is shown in green and the Old Channel LTBG reach in red.

**Table 2** SAV restoration goals

| REACHES | SPECIES | Meters squared of aquatic vegetation ($m^2$) | | | HCP TERM TIMELINE * | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current (2016) | Goal | Needed | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | |
| **LTBG Reaches** | | | | | | | | | | | | | | | | |
| Landa Lake | *Ludwigia* | 474 | 900 | 426 | 75 | 75 | 75 | 105 | 35 | 35 | 30 | | | | | 430 |
| | *Cabomba* | 240 | 500 | 260 | 50 | 50 | 50 | 30 | 30 | 25 | 25 | | | | | 260 |
| | *Sagittaria* | 2,759 | 2,250 | 0 | | | | | | | | | | | | 0 |
| | *Vallisneria* | 12,012 | 12,500 | 488 | 100 | 100 | 75 | 75 | 75 | 50 | 15 | | | | | 490 |
| | *Potamogeton* | 0 | 25 | 25 | 5 | 5 | 5 | 5 | 5 | | | | | | | 25 |
| Old Channel | *Ludwigia* | 7 | 425 | 418 | 75 | 75 | 75 | 75 | 50 | 50 | 20 | | | | | 420 |
| | *Cabomba* | 0 | 180 | 180 | 50 | 30 | 30 | 25 | 15 | 15 | 15 | | | | | 180 |
| | *Sagittaria* | 0 | 450 | 450 | 150 | 75 | 75 | 50 | 50 | 25 | 25 | | | | | 450 |
| New Channel | *Ludwigia* | 31 | 100 | 69 | | 15 | 15 | 15 | 15 | 5 | 5 | | | | | 70 |
| | *Cabomba* | 2,397 | 2,500 | 103 | | 20 | 20 | 20 | 20 | 15 | 10 | | | | | 105 |
| | *Sagittaria* | 0 | 0 | 0 | | | | | | | | | | | | 0 |
| Upper Spring Run | *Ludwigia* | 1 | 25 | 24 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| | *Cabomba* | 2 | 25 | 23 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| | *Sagittaria* | 825 | 850 | 25 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| **Restoration Reaches** | | | | | | | | | | | | | | | | |
| Landa Upper | *Ludwigia* | 0 | 25 | 25 | | | 25 | | | | | | | | | 25 |
| | *Cabomba* | 150 | 250 | 100 | | | 25 | 35 | 20 | 10 | 10 | | | | | 100 |
| | *Sagittaria* | 50 | 250 | 200 | | | 50 | 50 | 50 | 25 | 25 | | | | | 200 |
| Landa Lake Lower | *Ludwigia* | 5 | 50 | 45 | | | 15 | 10 | 10 | 5 | 5 | | | | | 45 |
| | *Cabomba* | 100 | 125 | 25 | | | 10 | 10 | 5 | | | | | | | 25 |
| | *Sagittaria* | 7 | 100 | 93 | | | 25 | 25 | 25 | 10 | 10 | | | | | 95 |
| | *Vallisneria* | 24,500 | 22,500 | 0 | | | | | | | | | | | | 0 |
| Old Channel ERPA | *Ludwigia* | 618 | 850 | 232 | 100 | 75 | | | 30 | 15 | 15 | | | | | 235 |
| | *Cabomba* | 119 | 200 | 81 | 25 | 25 | | | 25 | 10 | 5 | | | | | 90 |
| | *Sagittaria* | 591 | 750 | 159 | 75 | 25 | | | 35 | 15 | 10 | | | | | 160 |
| | *Vallisneria* | 715 | 750 | 0 | | | | | | | | | | | | 0 |
| | *Potamogeton* | 73 | 100 | 27 | 10 | 10 | | | 5 | 5 | | | | | | 30 |

*** Light grey shaded boxes with no numbers will still require aquatic gardening, plant propagation and supplemental plantings to support maintaining the goals and management objective over time. It is estimated that approximately 1/2 of the HCP annual budget for this mitigation measure would be needed each year to maintain these conditions from 2024 through 2027.**

**ASSUMPTIONS:**

**1)** Restoration efforts will proceed smoothly with no major setbacks or resets such as floods, culvert repairs, etc.

**2)** Anthropogenic factors such as recreational disturbances (swimming, wading and paddle boats), turbidity from swimming pools and urban runoff can be managed to provide the suitable water quality for aquatic plant growth.

**3)** Concurrent aquatic plant propagation, gardening, and maintenance will occur throughout the HCP timeline.

**4)** Non-native vegetation removal (and replacement with natives) will occur in certain areas (i.e. spring fed swimming pool, confluence with Blieder's creek, etc.) outside of the LTBG and Restoration reaches in order to assure that non-native plants don't reestablish.

**5)** Riparian restoration in the Old Channel is mandatory to accomplish the proposed goals.

**6)** No significant interuptions due to HCP Provision M.

**7)** Mapping to compare against goals will be conducted annually each Fall.

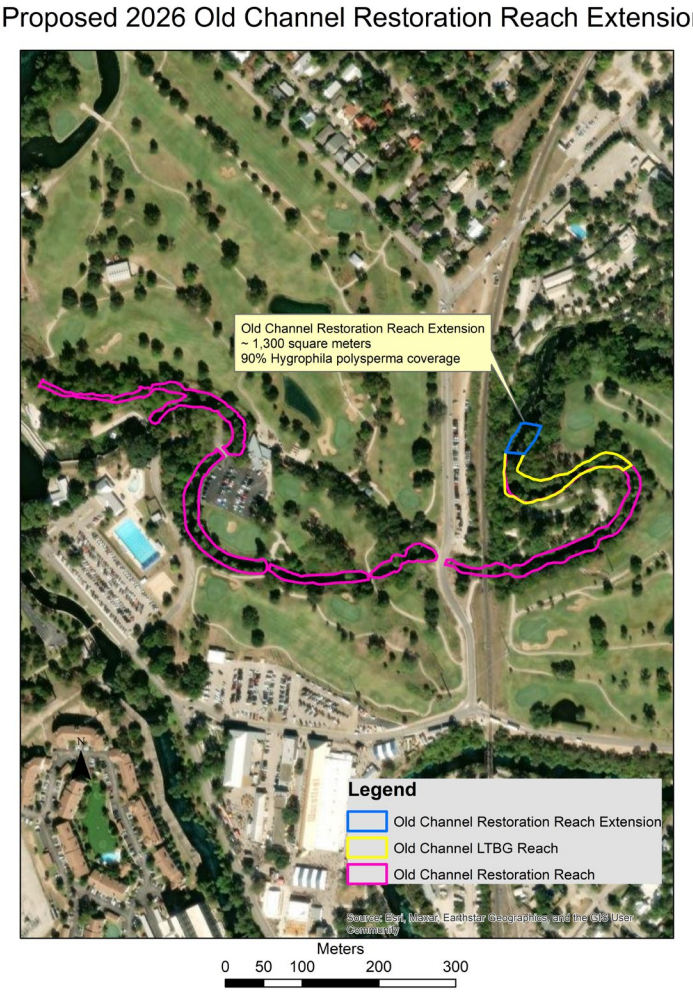



**Figure 2:** Restoration reach extension included with existing LTBG and restoration reaches for the Old Channel of the Comal River System.

## Methodology:

*Non-Native SAV Management:*

Non-native SAV (i.e. *Hygrophila*) has largely been removed from the Old Channel between Landa Lake and the downstream limits of the Old Channel LTBG reach. SAV gardening will occur on a monthly basis throughout the Old Channel LTBG and Restoration reaches to identify and remove any re-emergent non-native SAV. Small, localized growth of non-native SAV will be removed by selective physical extraction of visible plant and root mass.

*Native SAV Restoration:*

Target SAV species will be planted within the Old Channel LTBG and ERPA reaches to increase the coverage of individual aquatic plant species per the annual restoration goals

set forth in **Table 2**. Individual plant species will be planted where space is available and in locations within the channel where light exposure, flow velocities, and substrate provide the most suitable conditions. Supplemental plantings of *Ludwigia* and *Cabomba* will be planted in existing restoration plots in the Old Channel LTBG and ERPA reaches, as necessary, to maintain existing coverage and/ or to replace any losses in coverage due to floods, natural competition, or other factors.

*Ludwigia* will continue to be propagated in-situ within Landa Lake to provide plant stock for 2027 restoration efforts. In-situ propagation of *Ludwigia* will be conducted by collecting stem cuttings from *Ludwigia* plants present within the Comal River system. The cuttings will be placed in pots filled with substrate collected from within the Comal River system. The potted cuttings will be placed in Mobile Underwater Plant Propagation Trays (MUPPTs) that will be situated in a shallow portion of Landa Lake and allowed to produce roots and plant mass in advance of planting. However, this will not be conducted so long as the Comal Springs system is under Provision M. While under Provision M, Ludwigia will be sprigged by hand in selected locations to minimize disturbance.

*Cabomba* typically thrives in deep, low-velocity areas and will be planted in the most suitable locations in the Old Channel LTBG and ERPA reaches. *Cabomba* will be planted using stem cuttings and/ or with individual rooted plants. Stemmed cuttings will be collected from the New Channel and/ or the Spring-fed pool where *Cabomba* is abundant. The cuttings will be bundled into fist-sized bundles wrapped with rubber bands to keep bundles together. The *Cabomba* cutting bundles are typically 12 to 32 inches in length and will be planted at a depth of 2/3 their length, if possible, in soft, silty sediment. This planting depth prevents *Cabomba* from loosening and floating away and ensures multiple nodes are buried to encourage maximum development of root structure. Rooted *Cabomba* will also be utilized for planting. Rooted plants will be dug up individually from areas where *Cabomba* is abundant. The rooted plants will then be planted individually into silty streambed substrate. Both the stemmed cuttings and rooted plants will be planted in a grid-pattern at 1ft centers.

*Sagittaria* coverage will be monitored throughout the year to determine the extent of natural expansion and whether planting will be required. *Sagittaria* will be planted only as needed, in the most suitable locations in the Old Channel LTBG and ERPA reaches and will be planted as transplants harvested from Landa Lake and in the Old Channel where dense *Sagittaria* stands exist. The leaves of the transplants will be trimmed prior to planting to decrease buoyancy and drag. A few *Sagittaria* plants can form a dense colony within several months. *Sagittaria* has been observed to be slightly tolerant of lower light levels allowing it to be planted in deeper water and in shady locations.

Competition between native plants has been observed in the Old Channel where *Potamogeton* and *Sagittaria* have encroached on and taken over *Ludwigia* and *Cabomba* stands, resulting in loss of *Ludwigia* and *Cabomba* coverage. To minimize the effects of competition and to promote the growth and spread of *Ludwigia* and *Cabomba*, prioritized plot areas will be established for these species. The plots will be established by first clearing an area of *Sagittaria* and then planting *Ludwigia/ Cabomba*. Plant material that is removed

during this activity will be collected and removed from the lake/ river. The plots will be maintained by removing *Sagittaria* that encroaches into the plots.

Following planting of native SAV, monthly gardening and maintenance will occur between March and October to assess health of plants and to identify and remove any non-native vegetation that is beginning to establish within planting areas.

**Monitoring:**
As discussed in previous sections, areas where non-native vegetation removal has occurred will be routinely monitored for the re-establishment of non-native vegetation. Planted areas will also be monitored to assess expansion, die-off, and competition by non-native species. Once native aquatic vegetation is established in an area, monitoring will be conducted on a less frequent basis.

Vegetation mapping in both the Old Channel LTBG reach and the Old Channel ERPA will be conducted to evaluate SAV coverage and to assess the progress of aquatic vegetation restoration efforts. Mapping is conducted by circling the perimeter of vegetation stands with a kayak equipped with a Trimble GPS unit. Mapping will occur in January, April, and October. The October mapping event will be used as a basis for assessing overall SAV coverage with respect to developing annual restoration goals for 2027 and subsequent years.

**Budget:**
Table 7.1:
$100,000

Estimated 2027 budget:
$50,000

### 5.2.2.2/5.2.2.3 Comal River/ Landa Lake Aquatic Vegetation Restoration and Maintenance

**Long-term Objective:**
To achieve native submerged aquatic vegetation (SAV) coverage goals for the Landa Lake, New Channel, and Upper Spring Run LTBG reaches and the Upper/ Lower Landa Lake restoration reaches as set forth in revised EAHCP tables 4.1 and 4.1.1, respectively. The overall intent of native SAV restoration is to provide high quality habitat for the Fountain Darter.

**Target for 2027:**
Efforts in 2027 will include the planting and maintenance of target native SAV. **Figure 3** illustrates the Comal Springs/ River ecosystem and identifies the Landa Lake, New Channel and Upper Spring Run LTBG reaches as well as the Upper/ Lower Landa Lake restoration reaches. The annual aquatic plant restoration goals for the Landa Lake, New Channel, and Upper Spring Run LTBG reaches and the Upper/ Lower Landa Lake restoration reaches are specified by reach and vegetation type in **Table 2**. In addition to planting the target native aquatic plants, continued efforts will be made in 2027 to monitor for the re-establishment of non-native *Hygrophila* in Landa Lake, New Channel, and Upper Spring Run LTBG reaches and the Upper/ Lower Landa Lake restoration reaches. Any identified *Hygrophila* will be removed from the lake/ river.

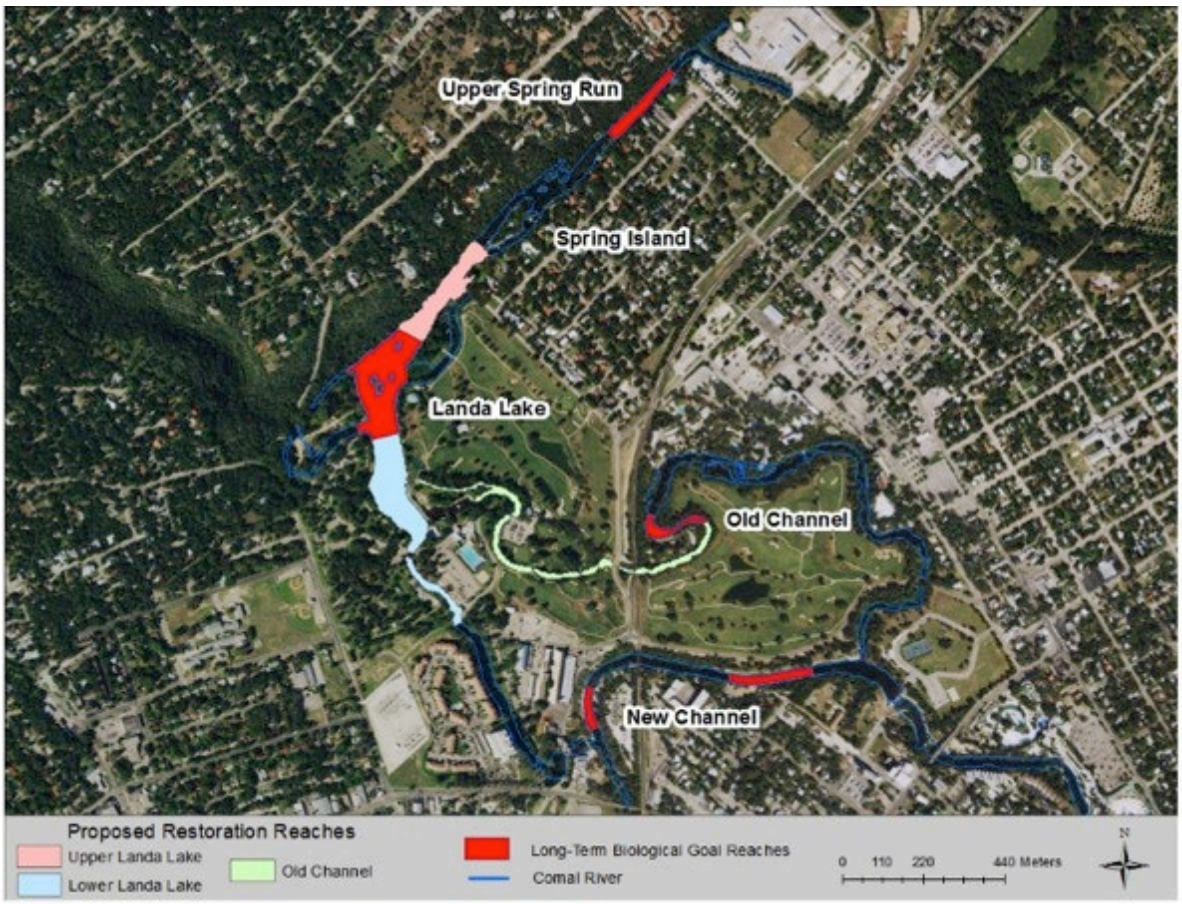



**Figure 3:** LTBG and restoration reaches for the Comal River System. The Upper and Lower Landa Lake restoration reaches are shown in light red and blue (respectively). The Landa Lake, New Channel, and Upper Spring Run LTBG reaches are shown in red.

**Table 2** SAV Restoration Goals

| REACHES | SPECIES | Meters squared of aquatic vegetation ($m^2$) | | | HCP TERM TIMELINE * | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Current (2016) | Goal | Needed | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | |
| **LTBG Reaches** | | | | | | | | | | | | | | | | |
| Landa Lake | *Ludwigia* | 474 | 900 | 426 | 75 | 75 | 75 | 105 | 35 | 35 | 30 | | | | | 430 |
| | *Cabomba* | 240 | 500 | 260 | 50 | 50 | 50 | 30 | 30 | 25 | 25 | | | | | 260 |
| | *Sagittaria* | 2,759 | 2,250 | 0 | | | | | | | | | | | | 0 |
| | *Vallisneria* | 12,012 | 12,500 | 488 | 100 | 100 | 75 | 75 | 75 | 50 | 15 | | | | | 490 |
| | *Potamogeton* | 0 | 25 | 25 | 5 | 5 | 5 | 5 | 5 | | | | | | | 25 |
| Old Channel | *Ludwigia* | 7 | 425 | 418 | 75 | 75 | 75 | 75 | 50 | 50 | 20 | | | | | 420 |
| | *Cabomba* | 0 | 180 | 180 | 50 | 30 | 30 | 25 | 15 | 15 | 15 | | | | | 180 |
| | *Sagittaria* | 0 | 450 | 450 | 150 | 75 | 75 | 50 | 50 | 25 | 25 | | | | | 450 |
| New Channel | *Ludwigia* | 31 | 100 | 69 | | 15 | 15 | 15 | 15 | 5 | 5 | | | | | 70 |
| | *Cabomba* | 2,397 | 2,500 | 103 | | 20 | 20 | 20 | 20 | 15 | 10 | | | | | 105 |
| | *Sagittaria* | 0 | 0 | 0 | | | | | | | | | | | | 0 |
| Upper Spring Run | *Ludwigia* | 1 | 25 | 24 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| | *Cabomba* | 2 | 25 | 23 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| | *Sagittaria* | 825 | 850 | 25 | | 5 | 5 | 5 | 5 | 5 | | | | | | 25 |
| **Restoration Reaches** | | | | | | | | | | | | | | | | |
| Landa Upper | *Ludwigia* | 0 | 25 | 25 | | | 25 | | | | | | | | | 25 |
| | *Cabomba* | 150 | 250 | 100 | | | 25 | 35 | 20 | 10 | 10 | | | | | 100 |
| | *Sagittaria* | 50 | 250 | 200 | | | 50 | 50 | 50 | 25 | 25 | | | | | 200 |
| Landa Lake Lower | *Ludwigia* | 5 | 50 | 45 | | | 15 | 10 | 10 | 5 | 5 | | | | | 45 |
| | *Cabomba* | 100 | 125 | 25 | | | 10 | 10 | 5 | | | | | | | 25 |
| | *Sagittaria* | 7 | 100 | 93 | | | 25 | 25 | 25 | 10 | 10 | | | | | 95 |
| | *Vallisneria* | 24,500 | 22,500 | 0 | | | | | | | | | | | | 0 |
| Old Channel ERPA | *Ludwigia* | 618 | 850 | 232 | 100 | 75 | | | 30 | 15 | 15 | | | | | 235 |
| | *Cabomba* | 119 | 200 | 81 | 25 | 25 | | | 25 | 10 | 5 | | | | | 90 |
| | *Sagittaria* | 591 | 750 | 159 | 75 | 25 | | | 35 | 15 | 10 | | | | | 160 |
| | *Vallisneria* | 715 | 750 | 0 | | | | | | | | | | | | 0 |
| | *Potamogeton* | 73 | 100 | 27 | 10 | 10 | | | 5 | 5 | | | | | | 30 |

*** Light grey shaded boxes with no numbers will still require aquatic gardening, plant propagation and supplemental plantings to support maintaining the goals and management objective over time. It is estimated that approximately 1/2 of the HCP annual budget for this mitigation measure would be needed each year to maintain these conditions from 2024 through 2027.**

**ASSUMPTIONS:**

**1)** Restoration efforts will proceed smoothly with no major setbacks or resets such as floods, culvert repairs, etc.

**2)** Anthropogenic factors such as recreational disturbances (swimming, wading and paddle boats), turbidity from swimming pools and urban runoff can be managed to provide the suitable water quality for aquatic plant growth.

**3)** Concurrent aquatic plant propagation, gardening, and maintenance will occur throughout the HCP timeline.

**4)** Non-native vegetation removal (and replacement with natives) will occur in certain areas (i.e. spring fed swimming pool, confluence with Blieder's creek, etc.) outside of the LTBG and Restoration reaches in order to assure that non-native plants don't reestablish.

**5)** Riparian restoration in the Old Channel is mandatory to accomplish the proposed goals.

**6)** No significant interuptions due to HCP Provision M.

**7)** Mapping to compare against goals will be conducted annually each Fall.

**Methodology:**

*Non-Native Vegetation Management:*

Non-native SAV (i.e., *Hygrophila*) will be removed, as needed, to minimize competition with native SAV. Large-scale removal of non-native SAV will not be required in 2027 as non-native SAV has largely been eliminated from Landa Lake and the Upper Spring Run area. Restoration areas will be monitored for the re-establishment of non-native SAV. Small, localized growth of non-native SAV will be removed by selective physical extraction of visible plant and root mass.

*Native SAV Restoration:*

Target SAV species will be planted within the Landa Lake, New Channel, and Upper Spring Run LTBG reaches, as needed. Individual plant species will be planted in locations within the Lake/ river channel where light exposure, flow velocities, and substrate provide the best conditions for the individual plant types. Supplemental plantings of *Ludwigia* and *Cabomba* will be planted in existing restoration plots within the Landa Lake, New Channel, and Upper Spring Run LTBG reaches, as necessary, to maintain existing coverage or to replace any drastic losses in coverage due to floods, natural competition, or other factors.

*Ludwigia* will continue to be propagated in-situ within Landa Lake in order to provide plant stock for 2027 restoration efforts. In-situ propagation of *Ludwigia* will be conducted by collecting stem cuttings from *Ludwigia* plants that exist within the Comal River system. The cuttings will be placed in pots filled with substrate collected from within the Comal River system. The potted cuttings will then be placed in Mobile Underwater Plant Propagation Trays (MUPPTs) and placed in a shallow portion of Landa Lake and allowed to produce roots and plant mass. *Ludwigia* plants propagated in the MUPPTs, as well as *Ludwigia* cuttings, will be planted in suitable locations within the Landa Lake LTBG reach, as needed. Slightly more than the targeted coverage of *Ludwigia* will be planted to account for plant die-off.

*Cabomba* typically thrives in deep, low-velocity areas and will be planted in the most suitable locations in the Landa Lake LTBG and Upper Landa Lake restoration reach, as needed. *Cabomba* will be planted using stem cuttings. Stemmed cuttings will be collected from the New Channel and / or the spring-fed pool. The cuttings will be bundled into fist-sized bundles wrapped with rubber bands to keep bundles together. The *Cabomba* cutting bundles are typically 12 to 32 inches in length and will be planted at a depth of 2/3 their length, if possible, in soft, silty sediment. This planting depth prevents *Cabomba* from loosening and floating away and ensures multiple nodes are buried for production of good root structure. Rooted *Cabomba* will also be utilized and will be harvested from areas in the Comal River system where *Cabomba* is abundant. Significantly more than the targeted coverage of *Cabomba* will be planted in order to account for plant die-off.

*Sagittaria* will be planted only as needed in the most suitable locations in the Upper Landa Lake and Lower Landa Lake reaches. Due to its aggressive growth habit, observed natural expansion and existing coverage, it is not anticipated that *Sagittaria* will be planted in 2027 within any of the restoration reaches. If needed, *Sagittaria* will be planted as transplants harvested from Landa Lake. The leaves of the transplants will be trimmed prior to planting to decrease buoyancy and drag.

*Potamogeton* will be planted to increase coverage in the Landa Lake LTBG reach. *Potamogeton* will be planted using bare-root rhizomes that are harvested from the Comal River system.
Competition between native plants has been observed where *Vallisneria* and *Sagittaria* will encroach on and take over *Ludwigia* and *Cabomba* stands. To minimize the effects of competition and to promote the growth and spread of *Ludwigia* and *Cabomba*, buffers will be created around planted *Ludwigia* and *Cabomba* stands to the extent practicable. Any plant material that is removed during this activity will be collected and removed from the lake/ river.

Following planting of native SAV, gardening and maintenance will occur on a monthly basis between March and October to assess health of plants and to identify and remove any non-native vegetation that is beginning to establish within planting areas.

**Monitoring:**
Routine monitoring will occur to identify re-establishment of non-native aquatic vegetation. Planted areas will also be monitored to assess expansion, die-off, and competition by native and non-native aquatic plant species. Once native aquatic vegetation is established in an area, monitoring will be conducted on a less frequent basis.

Seasonal vegetation mapping in the Landa Lake, New Channel, and Upper Spring Run LTBG reaches and the Upper/ Lower Landa Lake restoration reaches will be conducted to evaluate SAV coverage and to assess progress of aquatic vegetation restoration efforts. Mapping is conducted by circling the perimeter of vegetation stands with a kayak equipped with a Trimble GPS unit. Mapping will occur in January, April, and October. The October mapping event will be used as a basis for assessing overall SAV coverage with respect to developing annual restoration goals for 2027 and subsequent years.

**Budget:**
Table 7.1:
$50,000

Estimated 2027 budget:
$100,000

### 5.2.3 Management of Public Recreation

Public recreational use of the Comal River ecosystems includes swimming, wading, tubing, boating, canoeing, kayaking, golfing, scuba diving, snorkeling and fishing. To minimize the impacts of incidental take resulting from recreation, the City of New Braunfels will continue to implement existing recreation control measures as specified in Section 5.2.3(1) of the EAHCP and will seek voluntary participation in the Certificate of Inclusion (COI) program from outfitters who facilitate recreation activities within the Comal River system.

**Long-term Objective:**
To minimize and mitigate the impacts of recreation on endangered species habitat within the Spring Runs, Landa Lake and the Comal River.

**Target for 2027:**
Continue to enforce existing restrictions that limit recreational access to Landa Lake, Spring Runs, and the Old Channel of the Comal River.

Inform river recreation Outfitters of the EAHCP COI program.

**Methods:**
The City will continue to enforce City Code Sections 86-4 and 142-5 that restrict recreational access to Landa Lake, Spring Runs, and the Old Channel. Trained Park Rangers will continue to patrol applicable areas to prevent illegal access to these waterbodies.

In 2021, a survey was distributed to local river outfitters to determine the local interest in participating in the COI program. Results of the survey concluded that there was minimal interest in the community to opt into the COI program along the Comal River. If any river outfitters are interested in participating in the program, the City will work in conjunction with EAHCP program staff to develop COI program documents and strategies.

**Monitoring:**
Monitor the status of participating outfitters to comply with the minimum COI outfitter standards and requirements set forth in EAHCP § 5.2.3.

**Budget:**
Table 7.1:
$0

Estimated 2027 budget:
$0

### 5.2.4 Decaying Vegetation Removal and Dissolved Oxygen Management

**Long-term Objective:**
Maintain adequate dissolved oxygen (DO) levels within Landa Lake for the protection of the biological community, including the fountain darter. Minimize and mitigate oxygen consumption caused by decaying vegetation.

**Target for 2027:**
Collect DO data spatially throughout Landa Lake and the Upper Spring Run during low-flow periods (<100 cfs discharge at Comal Springs). Displace floating vegetation mats, as needed, that form on Landa Lake to prevent oxygen consumption by decaying vegetation (management of floating/ decaying vegetation will be funded and accomplished through the Litter and Floating Vegetation Management Conservation Measure [EAHCP § 5.2.10]). Remove decaying vegetation from Landa Lake and Upper Spring Run during low-flow conditions (<100 cfs), as needed, to mitigate low DO levels caused by low-springflow and decaying vegetation.

**Methods and Monitoring:**
Approximately four logging DO sensors (e.g., comparable to MiniDOT sensors available from Precision Measurement Engineering [PME Inc. Vista, CA] that have been used in prior years) will be installed in key documented Fountain Darter habitat areas in Landa Lake during periods when Comal Springs discharge decreases below 100 cfs. The sensor data will be downloaded, and the equipment will be cleaned routinely, as needed, to prevent fouling. The main objective of this data collection is to continuously monitor DO conditions during low-flow events and prompt DO mitigation activities.

Aquatic vegetation conditions and floating vegetation mats will be visually observed on a regular basis (i.e. weekly at minimum) to assess for signs of stress, die-off. Floating aquatic vegetation and dead aquatic vegetation has the potential to cause oxygen depletion from the decomposition of the vegetation itself and from reduced atmospheric reaeration. Should vegetation die-off be observed due to low-flow or if floating vegetation mats reach impactive levels (if mats cover >25% of the mid-lake area or if individual mats are >3 meters diameter), displacement or removal of the decaying vegetation or vegetation mats will take place within one week of identification as part of Litter and Floating Vegetation Management Conservation Measure (EAHCP § 5.2.10).

If low springflow conditions (<100cfs) occur and vegetation decay or low DO is evident, intensive displacement or removal of decaying vegetation will be implemented, as appropriate, under EAHCP § 5.2.10. Intensive refers to the frequency of vegetation mat management being more than once per week. Displacement and/or removal will be conducted in the least disruptive method tested to be effective, to limit any additional DO stress from stirring, turbidity, etc.

**Budget:**
Table 7.1:
$15,000

Estimated 2026 budget:
$15,000

*To be utilized only if low-flow conditions (<100cfs) are realized at Comal Springs.

### 5.2.5/5.2.9 Non-Native Animal Species Control

The City of New Braunfels will continue to implement a program to reduce non-native animal species in the Comal River system. The non-native animal species that will be targeted include the suckermouth armored catfish, sailfin catfish, tilapia, and nutria. Since this Work Plan has two components identified within the EAHCP, each component has been broken out to facilitate the development of the Work Plan and budgets.

**Long-term Objective:**
Reduce populations of non-native animal species to minimize their direct and indirect impacts to the Covered Species and the Comal River ecosystem.

**Target for 2027:**
Continue existing program to remove non-native invasive species, including tilapia, nutria, sailfin catfish and suckermouth armored catfish from the Comal River system utilizing removal methods proven successful in previous years. Continue to record counts and biomass of removed species per removal effort.

**Methods:**
Invasive species will be removed from Landa Lake and portions of the Comal River during routine removal sessions that will occur year-round.

Tilapia, sailfin catfish, and suckermouth armored catfish will be targeted throughout the Comal River system by divers with spears and spearguns. Upon removal from the water, all invasive fish will be eviscerated, in accordance with state laws, and disposed of. The carcasses will be measured (in inches) and weighed (in pounds). Total biomass of the removed fishes will be calculated. Total length of non-native fishes will also be measured to determine if, over time, the removal of adults affects target population demographics.

Box traps baited with carrots, sweet potatoes, and apples will be utilized to capture nutria. Traps will be placed in areas frequented by nutria (evident by slides, scat, chewed vegetation, lake-wall erosion and damage, and other observations). The traps will be checked in the late afternoon and again the next morning at approximately 7:30 am. Captured nutria will be euthanized. Removed nutria will be measured (in inches) and weighed (in pounds) prior to being disposed of**.**

**Monitoring:**
The non-native species removal program will involve obtaining and recording the following information:

- Date of removal.
- Number of hours worked.
- Type of species removed.
- Removal method.
- Number of individuals caught/speared.

- Total weight of individuals removed.
- Length of individuals removed.

The data provided will be used by CONB and EAHCP staff to generate catch per unit effort and to determine the effectiveness of the removal program.

The EAA Biological Monitoring program will also assess the status of non-native species populations and any impacts of non-native removal to the Covered Species.

***Reduction of Non-Native Species Introduction and Live Bait Prohibition***

**Long-term Objective:**
Minimize the introduction of non-native species to the Comal River system.

**Target for 2027:**
The City will enforce Ordinance No. 2019-42, City Code Section 142-4 and 142-6 enacted to control introductions of non-native aquatic organisms to the Comal River system.

**Methods:**
The City will uphold the ordinance prohibiting aquarium dumping and the use of non-native aquatic bait species.

**Monitoring:**
The EAA Biological Monitoring program and routine non-native removal sessions will detect the presence of newly introduced species.

**Budget:**
Table 7.1:
$75,000

Estimated 2027 budget:
$40,000

### 5.2.6/6.3.6 Monitoring and Reduction of Gill Parasites

**Long-term Objective:**
To assess the threat of the gill parasite (*Centrocestus formosanus*) and the intestinal fluke parasite (*Haplorchis pumilio)* on fountain darter populations by monitoring parasite cercariae concentrations in the water column.

**Target for 2027:**
Perform parasite water column cercariae monitoring at four established monitoring transects. Analyze monitoring data to determine the overall effect and potential threat of the gill parasite and *H. pumilio* to fountain darter populations.

**Methods:**
To quantify the concentrations of drifting parasite cercariae in the Comal River study area, the four transects (LL, OCR, RVP, and PI) that have been monitored during the previous years will continue to be sampled in 2027.The monitoring will occur once in late summer of 2027 in order to remain consistent with timing of previous years' monitoring.

**Figure 3** illustrates the parasite cercariae monitoring locations. The four sampling transects are considered locations that adequately represent the Comal Spring system and are efficient for long-term monitoring of drifting cercariae.

At each of the selected transect locations, 5-L water samples will be collected from six points that are distributed throughout the water column both horizontally and vertically. For each transect, three sampling stations will be established that are equally spaced across the stream channel perpendicular to flow. At each of these stations, two 5-L samples will be collected, one approximately 5 cm from the surface and one at 60% of the depth at that location. Samples will be collected using a modified livewell pump attached to a standard flow/depth measurement rod and buckets marked at the 5-L volume. At the time of collection, each water sample will be immediately treated with 5 milliliters (ml) of formaldehyde to kill parasite cercariae, thus facilitating their capture (live cercariae can wiggle through the filter device). Filtration will involve passing the sample through a specialized filter apparatus containing three progressively finer nylon filters, the final filter having pores of 30 microns. After filtration of each sample, the 30- micron filter containing cercariae will be removed from the filtration apparatus and placed in a Petri dish. Each sample will then be stained with Rose Bengal solution and fixed with 10% formalin, at which point the Petri dish was closed and sealed with Parafilm for storage. Cercariae on each filter will later be counted using high-power microscopy at the BIO-WEST laboratory.

**Budget:**
Table 7.1:
$75,000
Estimated 2027 budget:
$10,000

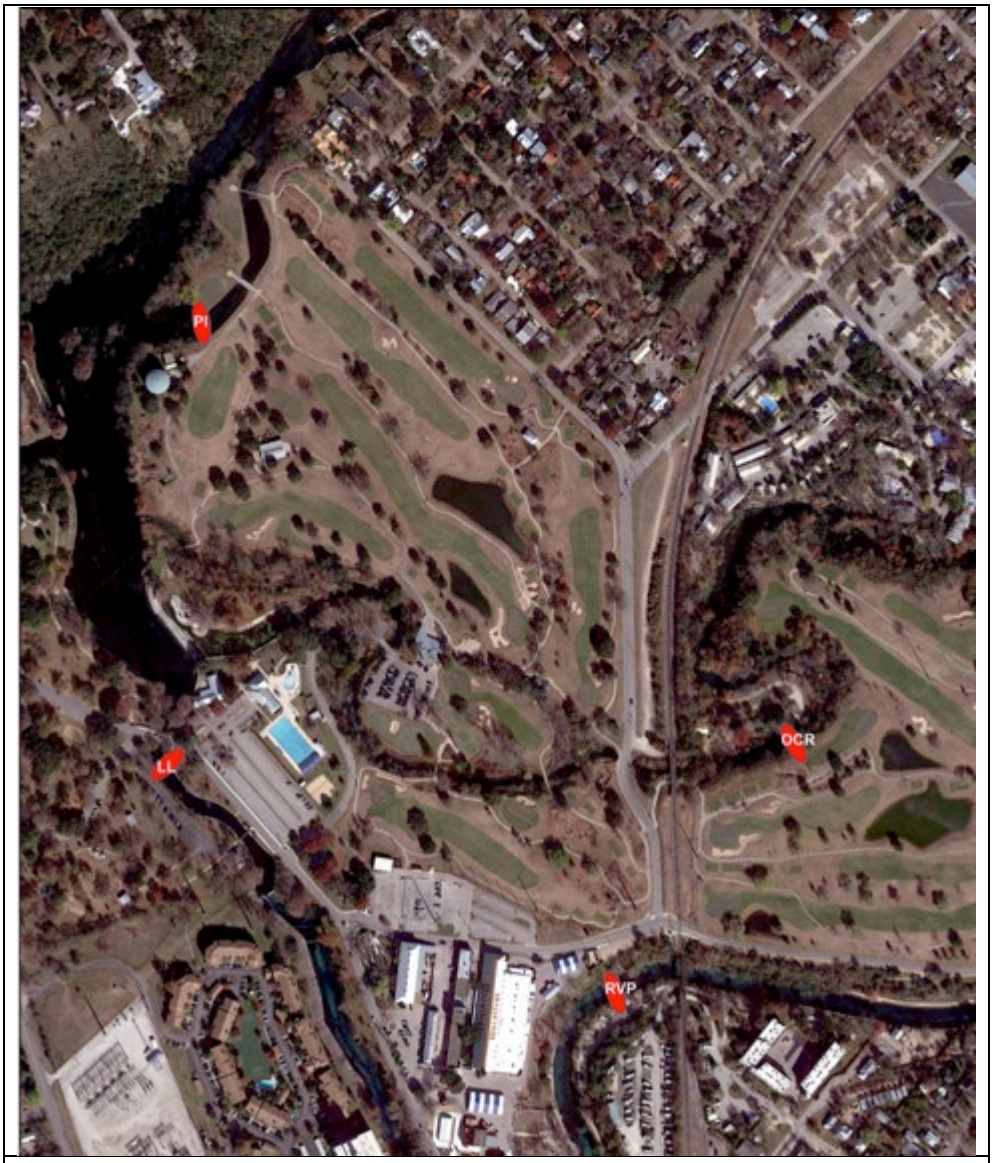



**Figure 3**. Parasite cercariae monitoring locations

### 5.2.7 Prohibition of Hazardous Materials Transport Across the Comal River and Its Tributaries

The City of New Braunfels will continue to prohibit the transport of hazardous materials on routes crossing the Comal River and its tributaries.

**Long-term Objective:**
To minimize the potential for accidental spills or releases of hazardous materials into the Comal River system that may cause negative impacts to the Covered Species.

**Target for 2027:**
Maintain existing HazMat transport signage and monitor for the presence of trucks carrying hazardous cargo on routes crossing the Comal River and its tributaries.

**Methods:**
City of New Braunfels Ordinance No. 93-7 effectively restricts the transport of hazardous cargo within Loop 337 and IH-35 and therefore, over roadways crossing the Comal River. Hazardous cargo route prohibition signage was installed in 2016 at key roadways near the headwaters of Landa Lake and the Comal River.

**Monitoring:**
Hazardous cargo restriction signage will be monitored and replaced/ repaired as needed. The City of New Braunfels Police Department will monitor for trucks carrying hazardous cargo on prohibited routes per City ordinance.

**Budget:**
Table 7.1:
$0

Estimated 2027 budget:
$0

### 5.2.8 Native Riparian Habitat Restoration (Comal Springs riffle beetle)

**Long-term Objective:**
Establish a healthy, functioning riparian area along Spring Runs 1, 2, and 3, and the western shoreline of Landa Lake to benefit the Comal Springs riffle beetle (*Heterelmis comalensis*). Establish native riparian vegetation to increase the stability of the bank, decrease erosion/ sedimentation and increase the amount of available food sources (i.e. course particulate organic matter) for the riffle beetle.

**Target for 2027:**

Monitor and maintain previously restored riparian areas along Spring Runs 1,2, and 3 and the western shoreline of Landa Lake. Plant additional native riparian plant species within the riparian buffer area, as needed, to increase the density of vegetative coverage in this area. Remove any re-emergent non-native vegetation and maintain sediment control berms. Replace/ maintain sediment control berms and install new berms, as needed.

The Comal County Water Recreation District (CCWRD) has proposed a remediation project to reduce the amount of silt and sediment deposited into Landa Lake during rain events and the removal the existing sediment from the western shore and lakebed of Landa Lake. Specifically, phase 1 of this project reduces siltation along the western shoreline of Landa Lake, northeast of Spring Island, via the installation of a permanent silt fence to slow the flow of water down the hillside toward the lake. This construction of the silt retention fence occurred in FY2025, finalizing the first phase of the project. Phase 2 will include removing the silt from the lakebed and spring orifices and reintroducing the native aquatic vegetation found in the surrounding area. Phase 2 is scheduled to begin in FY2027. This location is known to have many spring orifices and was historically considered to be excellent habitat for the Comal Springs riffle beetle (Heterelmis comalensis).

**Methods:**

*Monitoring/ Maintenance:*

Monitor the riparian zone along Spring Run 3, Spring Run 2, and the western shoreline of Landa Lake twice/ year, once in late spring/ early summer (April-June) and once in the fall (October) to assess for the re-emergence of non-native vegetation and to monitor the status of native plants and erosion control berms.

Mechanically remove and/ or re-treat with approved herbicide any observed re-emergent, non-native invasive plants within the riparian zone along Spring Run 3 and along the western shoreline, as needed.

Plant supplemental native vegetation, as needed, to increase density of riparian buffer area. Native vegetation will be selected based on root structure, light requirements, drought tolerance, growth habits and deer-resistance. Candidate native plant species may include\ those in **Table 4**. Erosion control berms may be re-constructed, as needed.

Monitor the stability and condition of existing sediment capture berms located along the western shoreline of Landa Lake. Repair and replace failing berms and install new berms as needed to help capture sediment prior to reduce sedimentation in Landa Lake.

Phase 2 of the Spring Island silt remediation project will include the mechanical removal of sediment from the western shoreline and lakebed of Landa Lake northeast of Spring Island. All removed sediment will be inspected prior to removal from the project site and all removed sediment will be hauled offsite and out of the surrounding floodplain of Landa Lake.

**Table 4.** Candidate riparian plantings

| Sun Species | Shade Species |
|---|---|
| Turks Cap (*Malvaviscus arboreus var. drummondii*) | Turks Cap (*Malvaviscus arboreus var. drummondii*) |
| Frostweed (*Verbesina virginica)* | Frostweed (*Verbesina virginica)* |
| Yellow Bidens (*Bidens laevis)* | Emory Sedge (*Carex emoryi* ) |
| Swamp Milkweed (*Asclepias incarnata*) | Boneset/ Mistflower (*Ageratina havanensis*) |
| Switchgrass (*Panicum virgatum*) | Elderberry (*Sambucus canadensis)* |
| Bushy bluestem (*Andropogon glomeratus*) | Giant spiderwort (*Tradescantia gigantean)* |
| Emory Sedge (*Carex emoryi* ) | Texas aster (*Symphyotrichum drummondii texanum)* |
| Sweetscent (*Pluchea odorata*) | Red salvia (*Salvia coccinea*) |
| Yellow compass plant *(Silphium integrifolium radulum*) | Inland Sea Oats (*Chasmanthium latifolium*) |
| Texas bluebells (*Eustoma exaltatum*) | |
| Trees and Shrubs | |
| American Beautyberry (*Callicarpa americana)* | |
| Bald Cypress (*Taxodium distichum)* | |
| Bee Brush (*Eysenhardtia texana)* | |
| Black Walnut (*Juglans nigra)* | |
| Burr Oak (*Quercus macrocarpa)* | |
| Buttonbush (*Cephalanthus occidentalis)* | |
| Eve's Necklace (*Styphnolobium affine)* | |
| Fragrant Sumac (*Rhus aromatica*) | |
| Green Ash (*Fraxinus pennsylvanica)* | |
| Mexican Buckeye (*Ungnadia speciosa)* | |
| Mexican Plum (*Prunus mexicana)* | |
| Mountain Laurel (*Sophora secundiflora*) | |
| Possum Haw Holly (*Ilex ambigua)* | |
| Red Buckeye (*Aesculus pavia)* | |
| Red Mulberry (*Morus rubra)* | |
| Dwarf Palmetto (*Sabal minor*) | |

**Budget:**

Table 7.1:
$25,000

Estimated 2027 budget:
$50,000

### 5.2.10 Litter and Floating Vegetation Control

**Long-term Objective:**
Minimize the impacts of floating vegetation mats and litter on aquatic vegetation and endangered species habitat in Landa Lake, the Spring Runs, and the upper portion of the Old Channel. Mitigate low dissolved oxygen levels in Landa Lake caused by decaying vegetation. Minimize shading of and negative impacts to aquatic vegetation caused by floating vegetation mats.

**Target for 2027:**
Dislodge floating vegetation mats and remove litter from applicable portions of the Comal River system to prevent negative impacts to flow control structures, aquatic vegetation, and endangered species habitat. In the event of low-flow conditions or receipt of depressed dissolved oxygen levels in Landa Lake, the removal of and/or increased efforts to dislodge floating vegetation mats will be initiated to prevent oxygen consumption by decaying vegetative material.

**Methods:**
*Floating Vegetation Mat Management:* Floating vegetation mats are commonly observed within Landa Lake and are composed primarily of macrophyte fragments, algae, bryophytes and terrestrial debris. The vegetation mats are naturally occurring and are the result of natural processes. Maintenance activities associated with floating vegetation mats in Landa Lake will involve dislodging floating mats and facilitating migration of the mats downstream of Landa Lake. Any litter found within floating vegetation mats will be removed prior to dislodging. Maintenance of floating vegetation mats will occur on a weekly basis between March and September and on an as-needed basis during the remainder of the year. Floating vegetation mats will be dislodged from flow control structures, the Three Islands area, fishing pier and other locations where vegetation mats accumulate and negatively impact native aquatic vegetation. Additional efforts to displace and/ or remove floating and decaying vegetation will occur during low-flow conditions (<100cfs) and/ or when low dissolved oxygen levels are observed to further mitigate impacts to dissolved oxygen and native aquatic vegetation.

*Litter Management:* (May 1$^{st}$ to September 30$^{th}$). Litter pickup within the riparian zone along the Old Channel will occur on a bi-monthly basis (twice/ month) between May 1$^{st}$ and September 30$^{th}$. Litter will also be removed from within the Old Channel to the extent that it can be removed with a 10ft trash grabber. Removed litter will be quantified and reported on a monthly basis.

**Monitoring:**
Monitor litter and floating vegetation mats in applicable areas on a weekly basis and more frequently if low-flow conditions occur. Dissolved Oxygen concentrations will be monitored by EAA and as part of the Decaying Vegetation Removal and Dissolved Oxygen Management Conservation Measure (EAHCP § 5.2.4). City staff will monitor contractor efforts and coordinate additional efforts when deemed necessary.

**Budget:**
Table 7.1:
$0

Estimated 2027 budget:
$40,000

### 5.2.11 Golf Course Management and Planning

The City of New Braunfels will implement their existing Integrated Pest Management Plan (IPMP) for Landa Park Golf Course. This process will incorporate public input and the Golf Course Advisory Board. The golf course IPMP will incorporate environmentally sensitive techniques to minimize chemical application, continue to improve water quality, and reduce negative effects to the ecosystem. Expanded water quality sampling targeted at Golf Course operations will be conducted as described in Section of 5.7.2 of the EAHCP.

**Long-term Objective:**
To manage the golf course and grounds in a way that minimizes negative impacts to the aquatic ecosystem in Landa Lake and the Comal River.

**Target for 2027:**
Continue to implement the IPMP and update as needed.

**Methods:**
The golf course and grounds will be maintained in an aesthetically pleasing, yet environmentally sensitive manner. It is the responsibility of the Golf Course Manager to maintain the course and grounds in accordance with the new IPMP. The IPMP describes chemicals and methods for controlling pests (i.e. insects, weeds, and other living organisms requiring control) on the golf course in a way that does not negatively impact water quality or endangered species.

**Monitoring:**
The EAHCP Water Quality Monitoring Program monitors surface water, groundwater, and fish tissue for a range of contaminants to collect information on the water quality of Comal Springs and associated surface waters.

**Budget:**
Table 7.1:
$0

Estimated 2027 budget:
$0

### 5.7.1 Native Riparian Habitat Restoration

**Long-term Objective:**
Increase the area and density of native riparian vegetation, reduce the coverage of non-native riparian vegetation, and prevent streambank erosion in areas immediately adjacent to the Comal River and Landa Lake to complement aquatic vegetation restoration efforts and to help protect water quality.

**Target for 2027:**
Remove non-native riparian vegetation from the banks of the Old Channel and along a portion of Landa Lake and plant native vegetation where non-natives are removed. The target work areas for 2027 are illustrated in Figure 5 and 6.

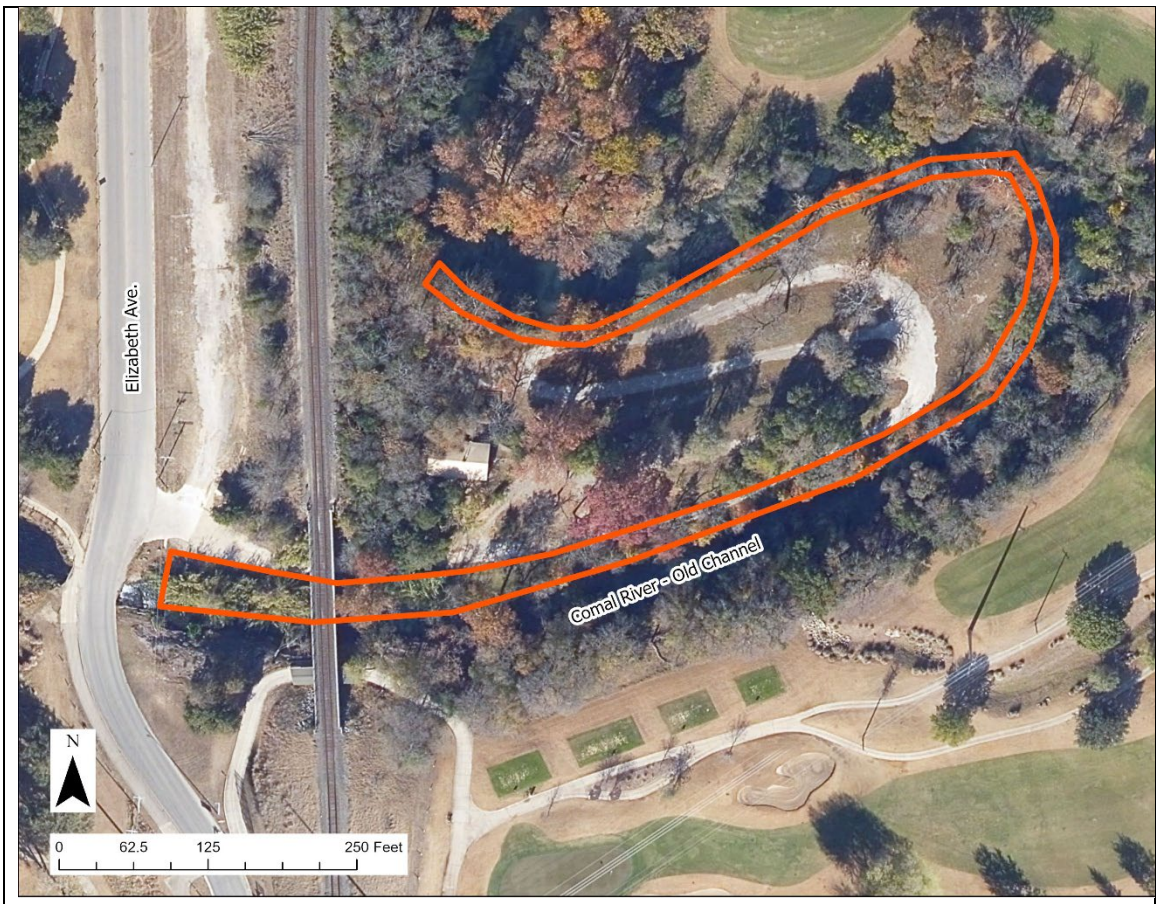



**Figure 5**. Location of 2027 riparian restoration, Schlitterbahn Employee Parking Area.




**Figure 6**. Location of 2027 riparian restoration, Spring Island and surrounding riparian area.

Monitor and maintain riparian areas where non-native riparian vegetation was treated/ removed in previous years to prevent re-establishment. Monitor and maintain previously planted areas to assess condition of riparian vegetation and promote the establishment/ growth of native vegetation. Plant additional native plants, and/ or grasses, as needed, to replace dead plantings or to vegetate bare areas. Maintenance of restored areas in Landa Park may include the installation of permanent fencing, as needed, to prevent disturbance of restored areas by park visitors.

**Methods:**

*Invasive Species Management:*

Non-native riparian vegetation will be treated with mechanical methods and/ or with use of an aquatic-approved herbicide. Elephant Ears will be treated in small sections to minimize overall herbicide usage and to minimize soil/ bank disturbance over large areas. Non-native trees will be cut and removed, and remaining tree stump treated with aquatic-approved herbicide.

Monitor areas where non-native plants were removed in previous years. Re-treat and remove re-emergent non-native vegetation.

*Native Plant Restoration:*

Install sediment control berms in locations where non-native plants are treated/ removed. Native plants will be planted following the successful treatment/ removal of non-native vegetation and installation erosion control berms. Native plants will be selected based on sun exposure, proximity to the stream, growth habit, and ability to withstand deer browsing. Candidate native plant species may include those in **Table 5 and 6.**

**Table 5.** Candidate riparian plantings for Landa Lake Golf Course and Landa Park

| **Trees and Shrubs** | **Herbaceous** |
|---|---|
| American Beautyberry (*Callicarpa americana)* | Coral Honeysuckle (*Lonicera sempervirens*) |
| Bald Cypress (*Taxodium distichum)* | Creeping Spotflower (*Acmella repens*) |
| Bee Brush (*Eysenhardtia texana)* | Emory Sedge (*Carex emoryi*) |
| Black Walnut (*Juglans nigra)* | Frog Fruit (*Phyla nodiflora*) |
| Burr Oak (*Quercus macrocarpa)* | Frostweed (*Verbesina virginica)* |
| Buttonbush (*Cephalanthus occidentalis)* | Horse Herb (*Calyptocarpus vialis*) |
| Elderberry (*Sambucus canadensis)* | Inland Sea Oats (*Chasmanthium latifolium*) |
| Eve's Necklace (*Styphnolobium affine)* | Switchgrass (*Panicum virgatum*) |
| Fragrant Sumac (*Rhus aromatica*) | Texas Lantana (*Lantana urticoides*) |
| Green Ash (*Fraxinus pennsylvanica)* | Turks Cap (*Malvaviscus arboreus var. drummondii*) |
| Mexican Buckeye (*Ungnadia speciosa)* | Water Willow (*Decodon verticillatus*) |
| Mexican Plum (*Prunus mexicana)* | White Boneset (*Eupatorium serotinum*) |
| Mountain Laurel (*Sophora secundiflora*) | Yellow Bidens (*Bidens sp.*) |
| Possum Haw Holly (*Ilex ambigua)* | Woodland Sedge (*Carex blanda*) |
| Red Buckeye (*Aesculus pavia)* | Zexmenia (*Wedelia acapulcensis var. hispida)* |
| Red Mulberry (*Morus rubra)* | |
| Dwarf Palmetto (*Sabal minor*) | |
| Soapberry (*Sapindus drummondii)* | |
| Sycamore (*Platanus occidentalis)* | |
| **Grasses** | **Forbs** |
| Buffalo Grass (*Buchloe dactyloides)* | Texas Bluebonnet (*Lupinus texensis)* |
| Eastern Gamagrass (*Tripsacum dactyloides)* | Purple Prairie Clover (*Dalea purpurea)* |
| Green Sprangletop (*Leptochloa dubia)* | Partridge Pea (*Chamaechrista fasciculata)* |
| Prairie Wildrye (*Elymus canadensis)* | Texas Yellow Star (*Lindheimera texana)* |
| Switchgrass (*Panicum virgatum)* | Gayfeather (*Liatris mucronata)* |
| Little Bluestem (*Schizachyrium scoparium)* | White Prairie Clover (*Dalea candida)* |
| Blue Grama (*Bouteloua gracilis)* | Lemon Mint (*Monarda citridora)* |
| Sideoats Grama (*Bouteloua curtipendula)* | Plains Coreopsis (*Coreopsis tinctoria)* |
| Curly Mesquite (*Hilaria belangeri)* | Indian Blanket (*Gaillardia pulchella)* |
| Indiangrass (*Sorghastrum nutans)* | Tall Goldenrod (*Solidago altissima)* |

**Table 5.** Candidate riparian plantings for Landa Lake Golf Course and Landa Park

| Trees and Shrubs | Herbaceous |
|---|---|
| Texas Cupgrass (*Eriochloa sericea)* | |
| Sand Dropseed (*Sporobolus cryptandrus)* | |
| Sand Lovegrass (*Eragrostis trichodes)* | |
| Big Bluestem (*Andropogon gerardii* ) | |
| Cane Bluestem (*Bothriochloa barbinodis)* | |
| White Tridens (*Triden albescens)* | |
| Western Wheatgrass (*Pascopyrum smithii)* | |
| Bushy Bluestem (*Andropogon glomeratus)* | |

**Table 6.** Candidate riparian plantings for Comal County Water Recreation District #1 Property

| Trees | Perennials |
|---|---|
| American Sycamore (*Platanus occidentalis)* | Coral Honeysuckle (*Lonicera sempervirens*) |
| Bald Cypress (*Taxodium distichum)* | Creeping Spotflower (*Acmella repens*) |
| Eastern Red Cedar *(Juniperus virginiana*) | Emory Sedge (*Carex emoryi*) |
| Cedar Elm (*Ulmus crassifolia*) | Frog Fruit (*Phyla nodiflora*) |
| Burr Oak (*Quercus macrocarpa)* | Damianita (*Chrysactinia mexicana*) |
| Eastern Cottonwood (*Populus deltoides*) | Fall Aster (*Symphyotrichum oblongifolium)* |
| Retama (*Parkinsonia aculeata*) | Four Nerve Daisy (*Tetraneuris scaposa)* |
| Eve's Necklace (*Styphnolobium affine)* | Frogfruit (*Phyla nodiflora)* |
| Texas Redbud (*Cercis canadensis var. texensis*) | Texas Lantana (*Lantana urticoides*) |
| Anacacho Orchid Tree (*Bauhinia lunaroides*) | Turks Cap (*Malvaviscus arboreus var. drummondii*) |
| Mountain Laurel (*Sophora secundiflora*) | Horsetail Reed (*Equisetum hyemale)* |
| Texas Persimmon (*Diospyros texana*) | Meahly Blue Sage (*Salvia farinacea)* |
| American Sycamore (*Platanus occidentalis*) | Missouri Primrose (*Oenothera macrocarpa)* |
| | Orange Zexmenia (*Wedelia acapulcensis var. hispida*) |
| | Pidgeonberry (*Rivina humilis*) |
| | Rock Rose (*Pavonia lasiopetala*) |
| | Snake Herb (*Dyschoriste linearis*) |
| | Tropical Sage (*Salvia coccinea*) |
| **Grasses** | **Shrubs/ Understory Plants** |
| Woodland Sedge (*Carex blanda*) | American Beautyberry (*Callicarpa americana*) |
| Eastern Gamagrass (*Tripsacum dactyloides)* | Buttonbush (*Cephalanthus occidentalis*) |
| Lindheimer Muhly (*Muhlenbergia lindheimeri*) | Coralbean (*Erythrina herbacea*) |
| Bushy Bluestem (*Andropogon glomeratus)* | Elderberry (*Sambucus canadensis*) |
| Switchgrass (*Panicum virgatum)* | Evergreen Sumac (*Rhus virens*) |
| Little Bluestem (*Schizachyrium scoparium)* | Fragrant Mimosa (*Mimosa borealis*) |
| Sideoats Grama (*Bouteloua curtipendula)* | Fragrant Mistflower (*Ageratina havanensis*) |
| Inland Sea Oats (*Chasmanthium latifolium*) | Indigobush (*Amorpha fruticosa*) |
| | Kidneywood (*Eysenhardtia texana*) |
| **Misc** | Mexican Buckeye (*Ungnadia speciosa*) |
| Lindheimer Marsh Fern (*Thelypteris ovata*) | Palmetto (*Sabal minor*) |

**Table 6.** Candidate riparian plantings for Comal County Water Recreation District #1 Property

| Trees | Perennials |
|---|---|
| Maidenhair Fern (*Adiantum capillus*) | Possumhaw (*Ilex decidua*) |
| Beargrass (*Nolina lindheimeriana*) | Red Buckeye (*Aesculus pavia*) |
| Texas Sotol (*Dasylirion texanum*) | Skunkbush (*Rhus aromatica var. trilobata*) |
| Alamo Vine (*Merremia dissecta*) | Texas Sage (*Leucophyllum frutescens*) |
| Coral Honeysuckle (*Lonicera sempervirens*) | Yaupon (*Ilex vomitoria*) |
| | Yellow Bells (*Tecoma stans)* |

**Monitoring:**
Previously restored riparian areas will be monitored for the re-emergence of non-native vegetation and success of native plantings. Sediment capture structures will be monitored for effectiveness. Monitor native riparian plantings for success. A riparian habitat assessment will be conducted in the spring and fall to evaluate the condition of the riparian zone.

**Budget:**
Table 7.1:
$100,000

Estimated 2027 budget:
$50,000

### 5.7.5 Management of Household Hazardous Wastes

**Long-term Objective:**
To minimize the potential for improper disposal of hazardous wastes and associated negative impacts to endangered species in the Comal River system.

**Target for 2027:**
Hold three household hazardous waste (HHW) collection events in New Braunfels. City of New Braunfels to continue prescription drug disposal program.

**Methods:**
Conduct three HHW collection events that incorporate an education and outreach component. The HHW events are coordinated by City's Solid Waste Division in conjunction with Comal County. The cost of the first two HHW events is shared between the City and Comal County. The EAHCP program will partially fund the third event.

HHW collection events are held at the New Braunfels City Hall. Hazardous waste that is collected during the HHW collection events will be hauled off and disposed of by Clean Harbors.

The City is continuing to explore the feasibility of implementing a HHW drop-off facility that will accept HHW on an ongoing basis throughout the year. Currently, it is expected that a HHW drop-off facility will be opened within three years. The facility will likely be open to the public 1-2 days/ week for the drop-off of HHW.

The City of New Braunfels Fire Department will continue to implement a year-round prescription drug disposal program. The program, which uses a Single Use Disposal System (SUDS), will be available for residents to safely and securely dispose of expired or unwanted prescription and over-the-counter medication at no cost. SUDS are self-addressed, postage-paid large envelopes that will be available at eight city-owned locations. Once filled with unwanted medication, the envelopes are sealed and anonymously mailed to a disposal facility.

**Monitoring:**
The volume of hazardous waste collected and the number of participants for each HHW collection event will be documented.

**Budget:**
Table 7.1:
$30,000

Estimated 2027 budget:
$40,385

### 5.7.6 Impervious Cover/Water Quality Protection

**Long-term Objective:**
To reduce non-point source pollutant discharges to Landa Lake and the Comal River system.

**Target for 2027:**
The City, in coordination with the CoNB Parks and Recreation Department and Arcadis, an engineering firm, will acquire the appropriate city, state, and federal permits for the construction of a bioretention system designed to accept and filter stormwater from a parking area along Landa Park Drive, located in Landa Park. This system will address point and non-point source pollution originating from this parking area and will remove the pollutants prior to discharging into the new channel of the Comal River.




**Figure 8**. Location of proposed biofiltration system along Landa Park Drive

**Methods:**
The City will contract with Arcadis, an engineering firm, that will then be tasked with permit acquisition for the construction of a bioretention system designed to accept and filter stormwater from a parking area along Landa Park Drive.

**Budget:**
Table 7.1:
$100,000

Estimated 2027 budget:
$55,000