

*San Felipe Creek Restoration Project: Devils River Minnow (*Dionda diaboli*) Final Report*

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Project Description

As part of the *San Felipe Creek Master Plan* (CP&Y et al. 2012a, 2012b), the City of Del Rio, Texas (herein referred to as “the City”) plans to conduct bank reinforcement/improvement along select locations of San Felipe Creek downstream of highway US90 (Attachment 1). As part of the requirements outlined in the U.S. Fish and Wildlife Service (USFWS) Biological Opinion (Consultation # 02ETAU00-2020-F-0588; Attachment 2), a federally permitted biologist is required on site during in-water construction activities in order to minimize direct impacts to the federally threatened Devils River Minnow (*Dionda diaboli*; DRM). To this end, the Environmental Institute of Houston at the University of Houston-Clear Lake (EIH-UHCL) was contracted by CP&Y, Inc. for these mitigation efforts (USFWS Native Endangered and Threatened Species Recovery Permit # TE30430B-0). The specific goals of the permitted biologist were to work alongside CP&Y biologists to:

- 1) Attempt to flush DRM from the in-water construction area(s) and
- 2) Capture, identify, and re-locate any DRM that become trapped behind the barrier during in-water construction and water draw down (“dewatering”)

Due to water infiltration within the target in-water construction area, initial closure and dewatering of the creek was aborted. As of this report, the City is working with contractors to develop an updated plan for closure and dewatering along the target areas of the creek. Biologists permitted by the USFWS will be informed of any future plans to resume work within the creek and will work with CP&Y, Inc. to secure a new services agreement contract for future work. UHCL will inform the USFWS when plans to resume work will commence. The following includes a description of the work completed to date and results of efforts to relocate DRM during the initial in-water construction attempt.

Methods

A federally permitted biologist (M. Gordon) and two biologists from CP&Y Inc. conducted reconnaissance efforts in order to confirm presence of DRM and identify sympatric species prior to initiation of in-water construction. Reconnaissance efforts were conducted via seine, hand net, and dip-net (0.125 in [3.175mm] mesh size) (Figure 1). Fish were identified, enumerated (when possible), and relocated up or downstream of the in-water construction area. Due to the overall goal of mitigating DRM mortality and because relocation efforts were conducted over multiple days, enumeration of DRM was not completed as the biologists were unable to confirm if an individual had been previously captured, relocated, and then recaptured on a later date.

To the best of our knowledge, based on observations made on site, Aqua-Barrier water-inflated cofferdam sections (HSI Services, Inc., Waller, Texas, USA) ranging from 25ft (7.62m) to 100ft (30.48m) in length and 13.5ft (4.11m) wide (when fully inflated) were used to close off the targeted construction area (Figure 1). Dam sections were deployed with a minimum 9ft (2.74m) overlap between segments in order to minimize potential for flow between gaps in dam segments. When fully inflated, dam height is approximately 6ft (1.83m). All in-water installation was coordinated by Spencer Construction (sub-contractor to the City) and supervised by EIH-UHCL and CP&Y, Inc. biologists. Prior to installation of dam segments, the area of installation was pre-emptively flushed for all species (including DRM). Multiple flushing attempts were made until the biologists were confident that DRM were no longer within the immediate vicinity of the installation area, or no specimen were observed in two sequential flushes.

Dewatering of the dammed area was initially performed using five gasoline powered self-priming sump pumps each fitted with a 25ft (7.62m) long, 3in (7.62cm) or 4in (10.16cm) diameter quick connect suction hose and 50-100ft (15.24-30.48m) PVC discharge hose. Suction hoses were fitted with steel strainers containing 3/8-inch (0.95cm) diameter round holes. Due to the suction potential for small bodied organisms, including DRM, all strainers were equipped with a secondary exclusion device composed of compostable mesh bags prior to placement in the water (Figure 2). An additional diesel powered self-priming sump pump fitted with 6in (15.24cm) diameter hoses and strainer with 1/2-inch (1.27cm) round holes (equipped with a secondary excluder) was later included.

After dewatering attempts were unsuccessful due to leaks in the cofferdams and likely subsurface flow, select sections of the cofferdam were removed, reopening the in-water construction area to flow and species dispersal. Draining was supervised by on-site biologists and 0.125in (3.175mm) mesh size nets were held over drain ports to mitigate potential for DRM to enter the cofferdam while draining.



Figure 1 *Left image:* biologists flushing area prior to in-water construction and dam section installation. *Right image:* installation and inflation of cofferdam section after area flushing.



Figure 2 *Left image:* example of strainer basket (lower left of image), intake hose (green), PVC discharge hose (blue), and quick connections (lower right of image) used for dewatering dammed area. *Right image:* Biologist removing accumulated vegetation and checking for mortalities on secondary exclusion device around strainer basket (yellow mesh).

Results

In-water construction was initiated on August 02, 2022. Due to delays and budgetary restrictions, the City restricted in-water construction to areas C-7 and C-10 of the original construction plans (Figure 3). This area represents approximately 900ft (274m) of stream directly adjacent to the Lieutenant Thomas Romanelli Memorial Park and the Dr. Alfredo Gutierrez Amphitheater (upstream-most dam location: 29.364776, -100.885762; downstream-most dam location: 29.363831, -100.887310; WGS84).

A detailed timeline of events is provided in Table 1. To summarize, cofferdam segments were installed between August 02-10, 2022. Initial attempts to dewater the dammed area were made between August 10-13, 2022. Between August 13-15, 2022, biologists remained on site while the contracted construction company worked off-site to develop a solution for issues with water infiltration. Between 0500 and 2000 on August 15, 2022, the construction area received a significant amount of rainfall (2.4 inches) resulting in visible increases to the water level along the cofferdam (Figure 4). During this rain event, biologists continued to monitor the dammed area for signs of die-off or stress to individuals still contained within the dammed area. An additional diesel-powered sump pump was acquired and used for a final attempt at dewatering the dammed area on August 16, 2022. On August 17, 2022, a meeting with the City and all contractors was held to discuss dewatering issues. In order to provide the City and its contractors time to develop further plans to mitigate water infiltration, select dam segments were drained and removed between August 18 and 19, 2022. All biologists departed the site on August 20, 2022.



Figure 3 Approximate location of cofferdam installation area based on construction plans provided to the City of Del Rio, Texas.

Table 1 Timeline of activities related to Devils River Minnow (*Dionda diaboli*; DRM) flushing, identification, and relocation during San Felipe Creek in-water construction.

Date	Construction Stage	Tasks Related to DRM Relocation
08/01/22	Pre-construction travel and planning	Travel from Houston to Del Rio; initial visit the construction site with CP&Y biologist for planning meeting
08/02/22	Dam installation	Initial flushing and relocation events prior to in-water construction; confirmed presence of DRM within construction area, all individuals safely relocated
08/03-06/22	Dam installation	Multiple flushing and relocation events prior to in-water activities related to dam installation
08/07/22	---	No activities performed
08/08-09/22	Dam installation	Multiple flushing and relocation events prior to in-water activities related to dam installation
08/10/22	Dam installation; Dewatering	Multiple flushing and relocation events prior to in-water activities related to dam installation; system closed; species removal and relocation from closed area; 4 hours dewatering
08/11/22	Dewatering; Vandalization repairs	Species removal and relocation from closed area; 6 hours dewatering
08/12/22	Dewatering; Seep identification	Species removal and relocation from closed area; 10 hours dewatering
08/13/22	---	All-stop to dewatering due to water table infiltration
08/13-14/22	Monitoring	Visits to site every 3-4 hours to watch for die-off events
08/15/22	Monitoring	Visits to site every 3-4 hours to watch for die-off events; significant rainfall accumulation (2.4 inches) throughout day
08/16/22	Dewatering (additional pump)	Species removal and relocation from closed area; 6 hours dewatering; full refill within 40 minutes
08/17/22	Planning meeting; Monitoring	Planning meeting with City representatives, CP&Y Project Manager and Biologists, USFWS Permitted Biologist, EIH-UHCL Contract Manager, and Construction Project Engineer & Project Manager; visits to site every 3-4 hours to watch for die-off events
08/18/22	Dam removal	Dam draining monitoring and attempts to keep species from swimming in to mats during draining; coordination meeting with CP&Y Project Manager to expressing concerns on impacts to DRM habitat
08/19/22	Dam removal	Dam draining monitoring and attempts to keep species from swimming in to mats during draining; 5 total mats (450 ft) left in water
08/20/22	Post-construction travel	Travel from Del Rio to Houston; gear decontamination

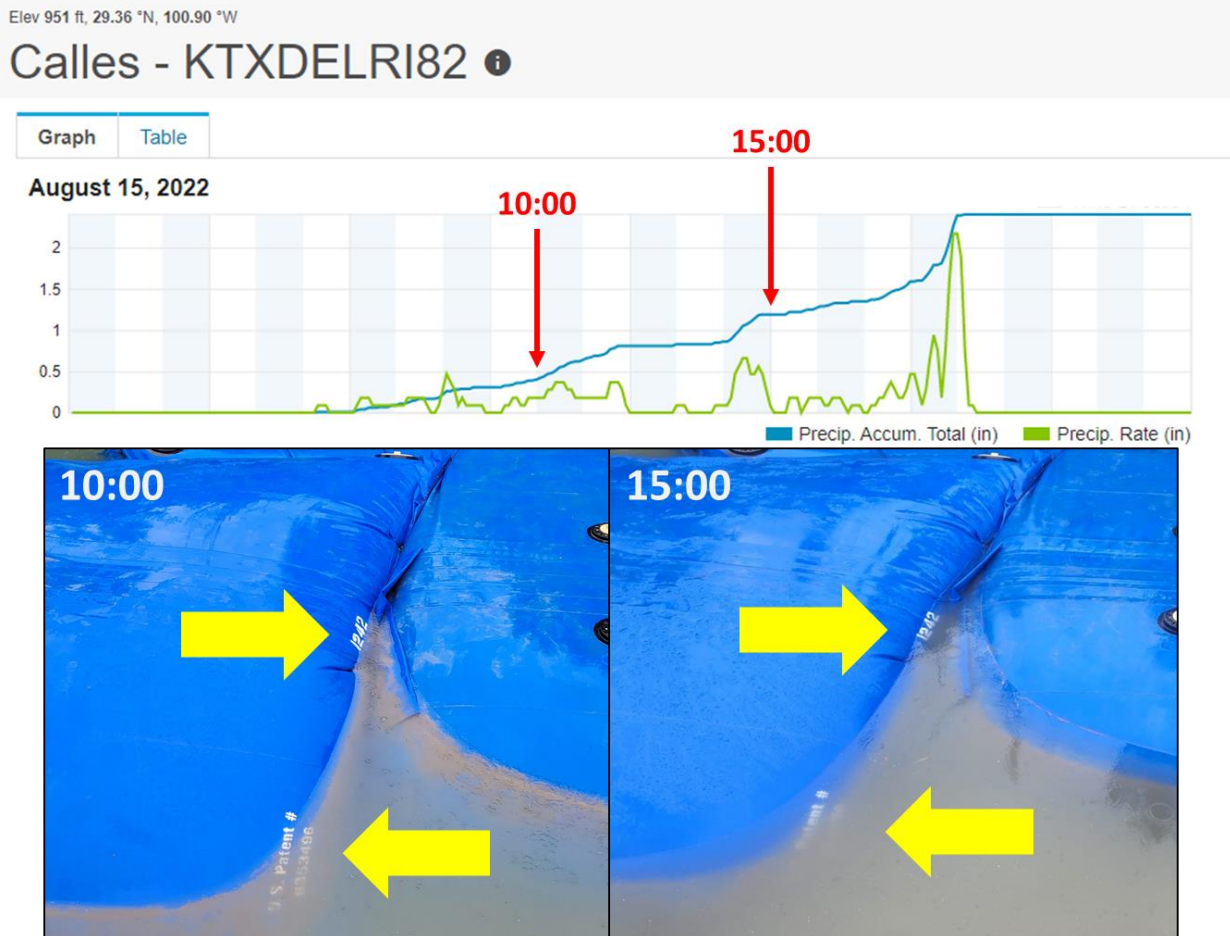


Figure 4 Significant rainfall event on August 15, 2022. *Top*: total accumulated precipitation (blue line) and hourly precipitation rate (green line) in inches between 0000-2400 hrs (station ID: KTXDELRI82 [<https://www.wunderground.com/dashboard/pws/KTXDELRI82>]; accessed August 26, 2022). Red arrows and times are coincident with time-lapse photos of water level rise on cofferdam segments (bottom left and right images). *Bottom left*: example of water level in relation to cofferdam segments at 10:00 on August 15, 2022. *Bottom right*: visible water level rise at 15:00 along same cofferdam segment as image from 10:00. Yellow areas indicate location of most visible water level rise in 5-hour period.

Multiple habitat types were flushed between August 02-16, 2022 including: 1) < 0.5m deep silt-dominated, vegetated corridors, 2) 0.3-1.0m deep gravel substrate dominated unvegetated areas, 3) variable depth bedrock and concrete dominated areas composed of multi-tiered ledges, and 4) variable depth undercut banks with mixed silt, gravel, and boulder dominated substrate. At least 10 DRM were captured within the in-water construction area, identified, photographed, and subsequently released unharmed between August 02-16, 2022 (Figure 5). Devils River Minnow were typically captured in low-flow, shallow (< 0.5m deep), vegetated areas similar to those in Figure 6. No DRM mortalities were documented throughout the in-water construction period. A complete list of fish species observed is included in Table 2.



Figure 5 Photographic voucher specimen of Devils River Minnow (*Dionda diaboli*) captured and relocated unharmed during in-water construction in San Felipe Creek August 02-16, 2022.



Figure 6 Example of existing Devils River Minnow (*Dionda diaboli*) habitat before (left) and after (right) in-water construction.

Table 2 Complete list of fish species observed during Devils River Minnow (*Dionda diaboli*) relocation efforts in San Felipe Creek, Del Rio, Texas (August 02-16, 2022). State and Federal designations based on Texas Parks and Wildlife Department’s Species of Greatest Conservation Need downloadable spreadsheet (TPWD 2020; LT = federally threatened, T = state threatened). All common (English and Spanish) and scientific names follow Page et al. (2013).

Common Name (English)	Nombre Común (Español)	Scientific Name (English)	Status (state)	Status (federal)
Mexican Tetra	sardinita mexicana	<i>Astyanax mexicanus</i>	-	-
Manantial Roundnose Minnow	carpa de manantial	<i>Dionda argentosa</i>	-	-
Devils River Minnow	carpa diabla	<i>Dionda diaboli</i>	T	LT
Rio Grande Darter	perca del Bravo	<i>Etheostoma grahami</i>	T	-
San Felipe Gambusia	--	<i>Gambusia clarkhubbsi</i>	-	-
Rio Grande Cichlid	mojarra del norte	<i>Herichthys cyanoguttatus</i>	-	-
Suckermouth Catfish	--	<i>Hypostomus plecostomus</i>	-	-
Redbreast Sunfish	mojarra pecho rojo	<i>Lepomis auritus</i>	-	-
Smallmouth Bass	lobina boca chica	<i>Micropterus dolomieu</i>	-	-
Largemouth Bass	lobina negra	<i>Micropterus salmoides</i>	-	-
Ghost Shiner	carpita fantasma	<i>Notropis buchmanani</i>	-	-
Blue Tilapia	tilapia azul	<i>Oreochromis aureus</i>	-	-

Future Project Plans and USFWS Permittee Recommendations

After dewatering attempts were deemed unsuccessful due to water infiltration from gaps in the dam sections, seepage through gaps under dam segments, and subsurface flow as a result of a high water table, a meeting was held on August 17, 2022 between the City and all subcontractors to discuss options moving forward. On August 18, 2022, the City opted to re-open the dammed area to flow and leave select sections of the cofferdam in place.

On August 18, 2022, federally permitted biologists (J. Oakley and M. Gordon) submitted a formal letter to CP&Y, Inc. and the USFWS with the recommendation that all cofferdam structures be removed from the channel (Attachment 3) citing the following potential impacts to DRM habitat and the existing coffer dam segments:

- Flow/velocity alterations impacting the DRM’s ability to utilize habitat around the barriers. The velocity around the barriers is increased beyond what is typical within this stretch of the creek, specifically in the section of the creek where the majority of DRM have been observed (Figure 7).
- The potential for future tropical weather events causing high flow conditions that could wash out the barriers causing impact to downstream habitat and fauna.
- The potential for long-term impact to the breeding, feeding, and sheltering habitat of the DRM that the barriers are directly impacting (sitting on top of), exacerbated by not knowing how long they may be in place.
- Access to the barriers by the general public, including potential for acts of vandalism similar to the event that was documented on August 11, 2022 where the aqua-barrier was punctured and lacerated (Figure 8).

As of this report, the remaining sections within the stream channel are coincident with the lower 450ft of the area noted as C-7 and C-10 on the original construction plans (Figure 3; Attachment 1). As of this report, none of the intended construction area(s) have been successfully closed off

or dewatered. It is unclear at the time of this report when in-water construction will resume. A new contract will be required for any further work that requires an EIH-UHCL permitted biologist to be on site for additional removal/relocation of DRM.

On August 26, 2022, permitted biologists learned that the remaining cofferdam segments were flushed an unknown distance downstream due to a 1.5in rain event earlier in the week (A. Esguerra, CP&Y Inc., San Antonio, TX, *personal communication*). This information was forwarded on August 26, 2022 to the lead ESA agent at USFWS (M. Mallek). On August 30th, the City supervised removal of the remaining coffer dam segments as part of an emergency action issued by the USFWS and U.S. Army Corps of Engineers. At the time of this report, it is unclear how much damage to DRM breeding, feeding, and sheltering habitat has been caused by the uncontrolled movement of the dam segments or if in-water construction efforts will resume.



Figure 7 Example of artificially increased water level and flow through confirmed Devils River Minnow (*Dionda diaboli*) habitat due to installation of coffer dam segments on August 18, 2022. Images were submitted in conjunction with USFWS Permittee formal letter to USFWS on August 18, 2022 (Attachment 3). Segment was removed from the channel on August 19, 2022.



Figure 8 *Left image:* example of vandalism (laceration) to cofferdam section (observed on August 11, 2022). The laceration was successfully patched on August 11, 2022. *Right image:* example of public access to and use of cofferdam section(s) (observed on August 13, 2022).

Literature Cited

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