

Gila River Basin Native Fish Program - Annual Reporting Meeting
December 7&8, 2021
9:00am-12:00pm

DRAFT MEETING NOTES

Annual Reporting Meeting Objectives

- Provide reports and updates on 2021 accomplishments and 2022 work planned

Next Annual Reporting Meeting

- December 13-15, 2022 at the Sonoran Desert Museum in Tucson, AZ (tentative location)

Action Items

- Contact Bill and Yvette with any eDNA samples to run
- Collect Verde bass fin clips and black bullhead samples and send to Yvette

Participants – see last page

Throughout the virtual meeting there were 17 computer-based presentations, which will be uploaded for viewing to the Gila River Basin Native Fishes Conservation Program website

(<https://www.usbr.gov/lc/phoenix/biology/azfish/>).

Day 1: 2021 Annual Reporting

Gila River Basin Monitoring, Kurt Shollenberger, Marsh and Associates, and Kent Mosher, Bureau of Reclamation - [see presentation here](#)

- 2021 Monitoring results
 - Methods have updated to improve consistency - now specific to focal species and water type
 - No Spikedace detected
 - Topminnow located in all surveyed streams
 - Largest catch in Morgan City Wash this year than ever in the past
 - More Topminnow than expected in Tule Creek; crowded with cattail
 - Significant cattle impacts in Fresno Canyon
 - Generally saw impacts from the monsoon season and nearby fires; dramatically lower catch on Blue River than in the past 3 years, despite great visibility (low turbidity)
 - On Turkey Creek, caught one yellow bullhead surprisingly far upstream from the confluence
- BOR Plans for 2022
 - Hoping to start a new contract with M&A in 2022
 - Goal is to detect non-native species in the CAP and Salt River

Canal Sampling, Kent Mosher, Bureau of Reclamation - [see presentation here](#)

- eDNA results
 - Successfully detecting non-native species, but experiencing challenges with accessing the CAP and coordination for sampling
 - eDNA metabarcoding can give a great snapshot of the fish community; has allowed for detection of more species than past sampling showed, particularly versus traditional sampling methods
 - Northern anchovy detected despite being a saltwater fish; common bait fish used in the lake
 - Still need more analysis before moving forward

Arizona Game and Fish Department, Brian Hickerson - [see presentation here](#)

- Gila topminnow and desert pupfish stocking/results
 - Topminnow sites considered “established” (will be passing monitoring to another program): Bill’s Wildlife Pond - Las Cienegas, Mud Spring, Peterson Ranch Pond, Black Canyon City Heritage Pond, Double R Canyon, Bass Canyon (though not a resilient population)

- Negative impacts to topminnow habitat and populations from fire
- Spikedace and Loach minnow stocking and results
 - 2018 stocked Spikedace population still surviving at Spring Creek; considering restocking this winter/spring
 - Middle Blue River hit hard by drought and fire impacts
- Chub activities
 - Spring Water Wetland population likely lost, not worth restocking
- Removal efforts
 - Need to tackle sunfish removal in headwaters in New Mexico
 - Sunfish are dispersing downstream from Verde River tanks when they overflow

Removal efforts in West Fork Black, *Zac Jackson, US Fish and Wildlife, and Brian Hickerson, AZ Game and Fish Dept* - [see presentation here](#)

- Huge abundance of Brook Trout (over 1000 caught in the first 4 passes at one location)
- Habitat of the West Fork is more complex, so likely led to a smaller population
- For AZGFD, Brook Trout removal is led by Region 1 in Pinetop
- Thompson Creek juveniles - hard to tell if that's where they hatched or if they moved in from up/downstream
- USFWS caught small fish often, but have not evaluated length frequency by pass yet, so don't know if the pattern is the same in both areas

New Mexico Department of Game and Fish, *Jill Wick, Jasmine Johnson, Dustin Myers, and Tim Frey* - [see presentation here](#)

- Bryan Ferguson left in June, and Jasmine Johnson took over in October
- Spikedace and loach minnow activities
 - Few loach minnow found generally; not great habitat due to drought, may be changing sampling locations to places with better habitat and perennial water
 - Fire impacts at Sapillo Creek
- Removal efforts
 - Bullhead and smallmouth bass are increasing
 - Native fish are generally rebounding after fire
- Gila permanent site monitoring
 - Much lower fish catch rates this year across all sites
 - Added a site at Nichols Canyon last year to capture the lower box area; previous site became too unsafe for sampling
 - Red shiner most common non-native caught
- Fires especially impacting permanent monitoring sites

Arizona Bureau of Land Management, *Heidi Blasius* - [see presentation here](#)

- Bonita Creek removal
 - Only using Promar and KreyTraps now for Yellow Bullhead
 - Educational component to removal efforts; engaging youth
- Aravaipa Creek removal
 - 23 miles of treatment area
 - Removed over 4000 Bullhead
 - Starting to look at biomass removed to better track success rates

Mobile Barrier Update, *Jeremy Hammen, BOR Technical Services Center* - [see presentation here](#)

- Tasked with researching available barriers that could help improve nonnative removal efforts
- Water-Gate system best option - not designed as fish barriers, so need some modification but there is a lot of potential
 - Debris would likely only need to be cleaned out once a day, but depends on flood patterns
 - Tester Water-Gate weighs about 50 lbs, but can be transported with a game cart if there is a trail

- Non-natives can get caught when removing the barrier, so it would have to be cleaned out well between sites
- In higher flow systems, the water can get up to the top and flow over; buoys attached to the top can help to hold it up and better direct the water to avoid overflow
- Hoping to test out in AZ/NM soon and demo this spring

Fish Barrier Update, Bill Stewart, Bureau of Reclamation - [see presentation here](#)

- 12 fish barriers planned; have now constructed 8 of these
- Bonita Creek - cleaned out the beaver dam upstream of the barrier
- Blue River - cleaned out sediment deposit
- Fossil Creek - inspecting in January for places of concern post-Backbone Fire
- Spring Creek - flood damage in July, but still working functionally as a fish barrier
- Planning:
 - Eagle Creek
 - Verde River - 2 possible locations, but working on Wild & Scenic Designation
 - San Francisco River (Pleasanton Diversion) - still looking into feasibility

Gila Chub Habitat Suitability, Kelsie Field, New Mexico State University - [see presentation here](#)

- Purpose is to recommend repatriation locations
- Assessed sites with extant populations to provide criteria (23 variables in the preliminary model) to be analyzed
- Model will also allow for analysis of how sites can be modified to become more suitable

Day 2: 2021 Annual Reporting

Welcome: Bill

BOR I&E Update, Kent Mosher, Marsh and Associates - [see presentation here](#)

- BOR not required to do I&E by USFWS, but instead are choosing to because it is good for the native fishes

Current programs

- Developing a field guide to the fishes of AZ
- Native Fish in the Classroom with NMFWC now virtual and ongoing
- Gila River Basin Fish Conservation Film Project getting started
- Sharing Tails, *Carol Pacey, Marsh and Associates*
 - Program [website](#)
 - Providing native fish education for K-2 grade (aligned with AZ science standards), free to schools with funding from BOR and USFWS and also selling merchandise like plush fishes (available [here](#))
 - This year, reached 1000 kids, 50 teachers, 11 schools, and 5 districts in Arizona; the hope is that these kids take what they learn back to their families and teach them as well
 - Have reached about 45,000 kids since 2008
 - Materials for before and after the school visit, and also available for remote-learners; talk about life cycles and the different native fishes
 - Have fish toys for kids to take home and funding was renewed to get more
 - Virtual format: 2 short session programs, rather than one longer session

Current and new projects

Ammonia as non-native control, Dave Ward and Eric Frye, USGS - [see presentation here](#)

- Researching ammonia as an additional tool: kills fish (targeted), naturally occurring and no toxic byproducts
- Cheap and locally available (\$15 at Walmart for a bag of ammonium sulfate)
- Process and source of ammonia is based on the natural pH level; if pH is low, can use soda ash; can also add pH increaser to the ammonia to reduce the total amount needed

- Large ponds require a 1:4 ratio (ammonia to soda ash)
- EPA regulates piscicides, need an experimental use permit (EUP) to try these methods
 - Exemptions available for small bodies of water (less than 1 acre) not used for drinking water
 - AZ has an additional statute (17481 - “Aquatic Poisons”) specifically prohibiting DEP from applying rotenone or annamycin A; AGFD interprets this to include ammonia which has made this research more challenging
- Eric’s thesis was funded through BOR; summarized all the work-to-date and compiled all of the compliance paperwork, ADEQ permits, etc.
 - Trial treatment in Agua Caliente in Tucson
 - PDF here - from chat
- Next steps
 - Upper Midwest Environmental Science Center applied for an EPA waiver to use carbon dioxide - this could be an option for trying out professionally well-known materials as piscicides (like CO2 or ammonia)
 - Will try CO2 for small bodies of water in AZ, then try ammonia through the same process; if not able to do ammonia in AZ, will go out of state or to private land for trials
- AGFD provided some clarification on the approval process: state law requires soil and water testing, not AGFD; all that’s required from AGFD is a project proposal
 - CO2 is already a registered piscicide, so would have to permit for that
 - Annamycin is being re-registered
 - AGFD has been really helpful in laying out the process
- Remaining questions
 - Possible increase in algal blooms; have not seen any yet, but need more information
 - Unknown if the waiver process for ammonia would fill the AGFD requirements

YY Male, Chad Teal, University of Arizona - see presentation here

- Gave an update on the project
- Have made a lot of progress on the research, but are currently pausing the green sunfish work as there is not enough capacity to do the necessary rearing treatments
- 36 green sunfish available for further research if needed

Recent Wildfire on the Gila - Dustin Myers, NM Gila National Forest - see presentation here

- Tadpole Fire 2020: High debris flow, salvage of 200 loach minnow, possible reintroduction forthcoming
 - Impacted Bear Creek, Sapio Creek, Trout Creek, Cow Creek
- Good/Turkey Fire - 2020 (and past fires in the same area)
 - low intensity, impacts to Little Creek and Turkey Creek
- Johnson Fire - 2021
 - Westfork drainage, low to moderate with limited high severity, lots of debris flow
 - Turkey Creek Gila Chub taken to Southwest Native Aquatic Research Center, returned in November
 - West Fork Gila salvaged 100 loachminnow and 48 spikedace, taken to ARCC

eDNA Yvette Paroz, USFS

- Interagency agreement to work with the National Genomic Center and Rocky Mountain Research Station - this is the last year (ends in August)
- Still have funds available to run eDNA samples - let Bill and Yvette know
- Use of eDNA varies by technique, can be found on website
- Re-running some samples from the San Francisco, Verde, etc.
- Still working on yellow and black bullhead markers; tried to do a generic marker for both but they need to remain separate
 - Need more tissue samples, especially from black bullhead
 - Some hybridization occurring
- Markers getting close for loachminnow and desert pupfish; hope they will be done by the end of this year

- Trying to get some eDNA samples from USGS collected in the upper San Pedro in Mexico to look for Chub
- Non-targeted sampling happening in the canals, but developing another technique with more specific species markers (limited by the number of species)
- Additional markers to develop
 - Specific bass markers for the Verde - [need fin clips, please collect during other sampling projects as able \(preserve and note location\)](#)
 - Gila Chub (can pick up with Roundtail marker)
 - Chihuahua Chub

Genetics Presentations

Spikedace and loach minnow - Alex Cameron, University of New Mexico

- All detailed information provided in the [final report](#)
- Informing genetic management through a range-wide genetic assessment of both species using NextRAD sequencing
- Spikedace
 - Used a reference assembly
 - High levels of heterozygosity, largely matching genetics of hatchery and wild populations
 - Need additional screening of the San Francisco broodstock
- Loachminnow
 - Used a de novo assembly using stacks
 - Consistently heterozygous, largely matching genetics of hatchery and wild populations
- Future question: how do disturbances impact inbreeding levels?

[Presentation](#) on topminnow - Steve Mussman, US Fish and Wildlife Service

- Gave an update and overview of the genetics management plan for topminnow
- Seeing unique genetic signatures in the Santa Cruz River drainage
- Unknown hybrids - in depth research to tease these out and determine what populations hybridized
- Looks like the small founder populations represent genetic bottlenecks that have shifted over time
- Seeing a general loss of genetic diversity
- Future question: how to consider success in establishing new populations?
- Moving forward: minimize moving populations from site to site

Hatchery Updates

Aquatic Research and Conservation Center *Josh Walters, AZ Game and Fish*

- 2021 Production numbers - [see handout](#)
 - Layout for lineages in tanks was reorganized
 - Discovered 1 year ago that Gila Forks loachminnow broodstock were mixed in 2015/16, so did not spawn this year but have a new broodstock moving forward
 - To avoid mixing lineages in the future, made a raceway modification
 - Prioritized Blue River loachminnow this year at Tony Robinson's request (919 offspring up from 16)
 - Aravaipa spikedace and Gila Forks less productive
 - Did not have a plan for the 2020 Bear Creek salvage; put in raceway (196 spawned)
 - Lineage in need: San Francisco loachminnow, Aravaipa (need more fish)
 - Good number available for stocking this year, let ARCC know
- Hatchery collection discussion
 - Combining lineages - forks and mainstem spikedace close in diversity and could be combined; need more information before combining lineages of loachminnow
 - In the past, the forks and mainstem populations were more different
 - May need more data before going ahead and combining
 - Need fish to reach 500 number, same as most years
- Modernization effort
 - Coop agreements established

- Compliance for phase 3 underway (conf room, wet lab)
- Submitted a request to AGFD internal development,
- On hold until the Department approves the project
- August 2023 hoping to have it complete

ASU Topminnow Holding, Kent Mosher - [see presentation here](#)

- Change starting in 2022
- Purpose: refuge for Gila and Yaqui topminnow
- BOR has been providing funds
- Project will end April 2022
- Fish will be stocked out to private lands

Stocking Evaluation, Keith Gido, Kansas State University - [see presentation here](#)

- Loachminnow and Spikedace stocking in the Gila River Basin
- Some stocking work, some don't- trying to optimize
- Pit tagging with mark recapture; 8mm pit tags for fish greater than 45 mm
- Follow up with stationary antennas or active wand surveys
- Detection probabilities to determine effectiveness; looking at parent survival of wild and hatchery
- 2021 in Spring Creek (repeat of last year), tagging of wild fish in west fork of Gila

CCAST

Non-native community of practice, Matt Grabau, USFWS - [see presentation here](#)

- [CCAST](#)
- YouTube [channel](#)
- Non native aquatic [case studies](#)
- For Community of Practice info, email: kminer@arizona.edu, matthew_grabau@fws.gov
- Green Sunfish Workshop - in January/February 2021, key takeaways were that while we know how to get rid of Green Sunfish, we need to do a better job of prioritizing projects, establishing clear success metrics, and figuring out what the long-term management looks like
- Future idea: how to maintain sportfish value of catfish and black bass but separate the predators from the native fish community - Channel Catfish impacts being looked at, but need more on Flathead
 - Scott and CCAST will follow up

Participants:

Participants

Vern

Rob Clarkson

Jennifer Graves

Julie Carter

Arizona Game and Fish Department

John Cleveland

Arizona Game and Fish Department

Hudman Evans

Arizona Game and Fish Department

Curt Gill

Arizona Game and Fish Department

Brian Hickerson

Arizona Game and Fish Department

Ryan Mann

Arizona Game and Fish Department

Joshua Walters

Arizona Game and Fish Department

Heidi Blasius (Ex-officio Member)

Bureau of Land Management

Timothy Frey (Ex-officio Member)

Bureau of Land Management

Kurt Shollenberger

Marsh & Associates

Carol Pacey	Marsh & Associates
Jasmine Johnson	New Mexico Department of Game and Fish
Jill Wick (Committee Member)	New Mexico Department of Game and Fish
Kelsie Field	New Mexico State University
Chad Baumler	US Fish and Wildlife Service
Nate Caswell	US Fish and Wildlife Service
Doug Duncan (Committee Member)	US Fish and Wildlife Service
Rosie Gonzalez	US Fish and Wildlife Service
Ryan Gordon	US Fish and Wildlife Service
Matt Grabau	US Fish and Wildlife Service
Shaula Hedwell	US Fish and Wildlife Service
Zachary Jackson	US Fish and Wildlife Service
Serena Kucera	US Fish and Wildlife Service
Tiffany Love-Chezem	US Fish and Wildlife Service
Steve Mussmann	US Fish and Wildlife Service
Jess Newton	US Fish and Wildlife Service
Mary Richardson	US Fish and Wildlife Service
Wade Wilson	US Fish and Wildlife Service
Stephanie Coleman	US Forest Service
Dustin Myers	US Forest Service
Yvette Paroz (Ex-officio Member)	US Forest Service
Albert Sillas	US Forest Service
Eric Frye	US Geological Survey
Kristie Miner	University of Arizona
Alex Cameron	University of New Mexico
Jeremy Hammen	US Bureau of Reclamation
Kent Mosher	US Bureau of Reclamation
Bill Stewart (Committee Member)	US Bureau of Reclamation
Carrie Eberly (Facilitator)	Southwest Decision Resources
Andi Rogers (Facilitator)	Southwest Decision Resources
Lisa Clark (Facilitator)	Southwest Decision Resources

**Gila River Basin Native Fish Program -Technical Committee Meeting
December 9, 2021
9:00am – 12:00pm**

DRAFT MEETING NOTES

Participants: See last page

Action Items:

- Bill send program review document and Strategic Goals progress document
- Mary send Spikedace and Loachminnow overview/re-cap
- Bill send updated list of Tier 2 projects
- Everyone send ideas for new Tier 2 projects
- **Next meeting:** March 28, 10am -12pm, see calendar invite

Structure of the GRBNFP Group - overview:

- Technical Committee (USFWS, NMGF, AGFD, BOR, BLM, FS)
- Policy Committee (Sean Health, Jeff Humphreys, Julie Carter, Kirk Patten)

Recap of Day 1 and 2

- **Next steps**
 - Presentations to go on the website, corresponding notes to go with them.
 - Kent will upload the presentations (recording) on the website.
 - SDR has most of the presentations PDF's
- **Reflections:**
 - Live presentations are preferred over pre-recorded
 - Seemed like we needed more time for questions (ask speakers for how much time)
 - Liked the multi-day worked well
 - Quality of the presentations was great
 - Could propose a 9-11am, 1-3pm option for next time, it would provide for more discussion

Process overview and update for GRBNFCP- Bill Stewart, BOR and Doug Duncan, USFWS

- Recent changes to how the technical and policy committee operate (USFWS felt there was a conflict of interest)
 - Projects are ranked by the technical committee, but they do not vote on them, then they are passed to policy committee
 - Committee members cannot vote or rank your own project
 - The Technical and Policy Committees do try to reach consensus
 - Then USFWS and BOR make final decisions
 - Next year, the Strategic Plan expires which includes the mechanics for project ranking
- **Policy committee:**
 - Jeff Humphreys is retiring, therefore there will be a new rep for USFWS
 - Mark Lamb may fill the positions until a new person is selected
 - Should know in the next week or so about an acting structure
- **Program guidance review, timeline and discussion - Bill's handout (GET)**
 - Write-ups due January - week turn around

- Feb 1st for draft reports (from previous year - one month for review from BOR)
- March meeting - discuss work plan, send out draft and ask for project evaluation and ranking from committee members
- April 1 - final annual reports
- Scoring happens - and sent out results ahead of policy committee in May/June
- USFWS/BOR make final decisions to the work plan
- **Strategic Plan timeline**
 - End of 2022, 5 year plan “expires”
 - Doodle poll - for a mid Jan call with tech and policy committee to review the old plan and how/what needs to change.
 - revision of Plan my March - month to comment
 - May/June Policy committee to review and make changes
 - August new draft for comments
 - Final draft October/November 2023
- **Current Strategic Plan**
 - <https://www.usbr.gov/lc/phoenix/biology/azfish/conservationefforts.html>
 - 5 goals - each year try to update in a color coded version to track progress.
 - Bill will update and send out of Tech committee
 - Recovery needs: highlighted
 - Scoring and project selection - opportunity to refine and make changes
 - WMI audit happened pre last version of the strat plan
 - Current commitment from BOR will be done in a few years, upcoming consultation early next year will help determine roles and what the program will look like in the future
 - might impact the Strat Plan Revision
 - SDR can help if need be
 - Review of what goals haven't been met - **Get color coded file from Bill**
 - Subgroup to look at acquisition for water rights - didn't happen
 - Everything else looks pretty complete
 - Consultation process will require an analysis of where the program is in terms of goals/objectives, etc

FY 2022 Workplan

- **NMDGF (file attached)**
 - Change: project 3 - remote site monitoring - due to Johnson Fire
 - Change from SF to West Fork Gila
 - Hart bar: Comment: non native numbers going up? Need to increase effort?
 - Matt and Brian F working on a more comprehensive analysis of removal, need to create more defined benchmarks (then Brian left). Will be back on the table for next year with Jasmine on board. Will try to come up with a revised plan for monitoring. Yellow bullhead and Flathead on the increase.
 - Middle Fork site - been a while since SD and LM have been caught? Change in habitat?

- Yes, concerning, primarily due to habitat changes
 - transitions to non-native over the last 2 years
 - hard to know what to do, due to the openness of the system
 - water temp impacts here
 - Barrier? interest here? NMDGF would love to put in a barrier below Little Creek but its a huge drainage therefore treatment and renovation would be complicated. Really big project
 - Source of small mouth? coming from the east fork and then from the canyon bound reach. A lot of small mouth in east fork, therefore likely the main source
 - Going to be constant maintenance, fires have changes habitats and temperatures
 - Remote site monitoring in the middle fork, non natives were not too far Tons of chub in the middle fork
 - Hart Bar reach - Middle fork - good to do some more monitoring here
- System is in flux, so may wait to drop off measuring habitat variables (dropping would increase efficiency).
 - **AGFD**
 - Changes Spring crk got hit with a flood, less SD. ARCC has 1-2k Araviapia lineages
 - Stock SD in winter in Spring Ck proposed
 - Other change (no cost) - Lower blue - Gila river will be stocked here
 - easily take on this year
 - Fossil Creek -
 - SD addition? if and when
 - When was last fish survey? Not sure, need to ask Reg 2
 - summer/fall usually
 - BLM
 - No changes, 5 trips to Aravaipa and 6 to Bonito

Spikedace and Loach Minnow Re-cap, *Mary Richardson, USFWS, and Bill Stewart*

- Held separate SD and LM meetings, early Nov for both NM and AZ
- Discussed monitoring, annual activities, fire,
- Notes are combined in 1 doc
- Monitoring is
 - Going well, still excellent coverage for known locations in both states (thanks to both states!)
 - Multiple sites in both states
 - Upcoming: BLM still has to conduct fall monitoring and collection of DNA in Blue creek
 - Jill reported work was delayed and SF may get pushed off 1 year due to fire
 - Looking for additional sites in NM
 - Fossil Creek discussions
 - Lower SF work in AZ may be needed, potential for future suppression and translocation of SD and LM.

- Work plan coordination needed here
- Fires impacted fish in multiple locations
 - Salvage efforts were successful due to partnerships and taking in fish at ARCC
 - Upcoming; extent of impacts not known, need of follow up
 - How much of range impacted, potential more crown fire, how will it effect management decisions
 - more salvage needed, 2nd hatchery online, considerations for translocations
- Non-native removals
 - Keep USFWS looped in on what you need
 - Valuable program
 - Funding available for more non native removals
 - AZ has been successful in getting rid of Non native sunfish
 - LM Bass found in SF - potential for a barrier
- San Francisco
 - Pleasanton diversion permit for barrier here?
 - BOR went to look at diversion structure, sluss gate was open, when closed its serving as a barrier
 - Lot of non-natives downstream, would be a good site
 - On list for future barriers
 - also looked a few sites further downstream that had promise
 - Next year, will need to coordinate effort for site visit'
 - Land owners seems initially supportive
 - eDNA in this area will continue, in spring
 - Flathead on middle fork site, good to get a hold on how far upstream
- BLM monitoring on mainstem Gila
 - Non natives here such as red shiner (Chad Teal's work)
 - Cherokee canyon site productive for SD and LM and not many Non natives
 - changes in stream structure
 - SD coming up from bird area
 - LM good habitat and lack of predators
 - Nichols cyn site - 2019 and last year some SD and some LM
 - If we remove catfish, Tim thinks resident pops will increase in both spp.
 - Good project on non native removal to look at pulse response of SD and LM
- Genetics (get from Mary)
 - Need additional discussion with Alex and Tom turner about mixing lineages
 - waiting for genetics management plans will provide further guidance on lineages and broodstock
 - SNARC - will be reaching out with more info
 - USFWS - genetics will be incorporated into recovery plans for both spp
 - Gila Forks and Gila main stem questions.. will discuss with Tom and Ales
 - May - spawning tanks? Decision by? Mary will coordinate with Josh
- Stocking
 - Upcoming discussions - restock Spring Ck, based on discussion, soft release, look at survival with pit tag/receiver equipment
 - More for Fossil?

- SD in lower blue - some sedimentation may be influencing habitat.. not full agreement here about timing. Stock with tagged fish? More discussion here
 - Bear Wallow cyne in Wfork Black.. Issues to be resolved on lineages
 - Barriers
 - Bonito creek (2023)
 - Upper Verde (2024)
 - Eagle creek - stock with tagged fish to learn
 - Future discussion for post barrier placement
 - Definition of occupancy vs extirpation - need clarity here
 - portable barrier - 1 in AZ and 1 in NM
 - Eval of barrier in SF continues
 - Research
 - ARCC tagging SD and LM,
 - Benefits of BEI vs Pit tagging
 - KS state, more info on results for predator avoidance studies in LM
 - New hatchery in NM - ALBQ- discussions starting
 - 1 site visit has happened
 - minimal investment with good results
 - would help NM, more fish - more salvage space
 - Fossil will be surveyed in august - 849 SD observed
- Mary will set up follow up meetings for SD and LM and send overview.

Proposed Projects

- 2023 proposed projects
 - NMDGF - Continuation of 4 existing projects
 - Analysis of Hart bar
 - Expanding stocking in several locations
 - ALBQ biopark - would make NM's life easier
 - AGFD
 - Minor changes - Upper Verde; savings
 - Added Topminnow locations for stocking
 - USFWS supports main drainage work
 - Genetic management planning may shift Top Minnow management
 - BLM
 - Aravaipa and Bonito - same number of removal trips, will have extra money and hopefully have an idea if they can get Yellow bullhead out of both streams
 - Agreement/contract/hire interns? Decisions needed
 - None for Tim

Tier 2 opportunities

- Brainstorm - **Get list from Bill**
- Ask whole group for more ideas when notes are sent out, further prioritization could happen (3-5 year projects)
 - Look at old list -
 - Pupfish genetics project - more support this year

- The XYTE Verde/Horseshoe project is still under discussion with USFWS and AGFD leadership
- Impacts of stocking fish into fishless streams on aquatic macroinvertebrates
- Research on ways to manipulate flowing water for invasive species removal
- CCAST could be beneficial when there is a need for large amounts of people to do work like mechanical removal
- Comments on YY male
 - wrapping up soon and will have YY red shiners
 - need for a focused discussion on what to do with these
 - ARCC, use for future study?
 - [Bill will set up a meeting to discuss](#)
- TNC modeling
 - Aravaipa to Wilcox basin - how this will affect water and fish
 - \$\$ to fund the study
- Goes with Acquisition goal: well at Coal Mine canyon?
 - Betsy has asked and no one seems interested
- Topminnow connectivity
- Hiring ACE crews that could work with biologists on nonnative removal projects. These crews do up to 10 day hitches and can carry a lot of equipment and they work hard.

Wrap-up Next Steps

- March 2022 call
 - Technical committee meeting - March 28 - 10am-12pm
 - Aravaipa blitz discussion
- 2022 meeting location and date
 - Dec 13-15, 2021 meeting - Tucson
 - 1st choice: Sonoran Desert Museum location,
 - 2nd choice: University of AZ
 - Field trip included somewhere
 - Santa Cruz reach, Scott Bonar's lab, or other

Participants

Heidi Blasius (BLM)
 Doug Duncan (USFWS)
 Tim Frey (BLM)
 Curt Gill (AGFD)
 Brian Hickerson (AGFD)
 Jasmine Johnson (NMDGF)
 Kent Mosher (BOR)
 Yvette Paroz (USFS)
 Mary Richardson (USFWS)
 Bill Stewart (BOR)
 Jill Wick (NMDGF)
 Matt Zeigler (NMDGF)

Facilitation:

Carrie Eberly (SDR)

Andi Rogers (SDR)