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To: [Reagan, Steve](#); [Broska, James](#); [Harris, Grant](#); [Baca, Joaquin](#); [Kundargi, Darrell](#); [Stewart, David R](#); [Sesnie, Steven](#); [Radke, Bill](#); [Fernandez, Juliette](#); [Walker, Cassandra M](#); [Harden, Tasha](#); [Burck, Peter](#); [macmilar](#)
Subject: San Bernardino NWR Water Team Meeting Notes
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Hi Everyone,

Thank you for your participation on the water team call today. I've uploaded draft meeting [notes](#) to Teams for your review. If you have edits you'd like me to make, please contact me. Alternatively, you're welcome to make edits.

Please let me know if you are unavailable for our next team call tentatively scheduled for **9 a.m. Mountain / 8 a.m. Arizona time** on **Thursday, June 4**. Thank you.

Peter

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San Bernardino NWR Water Team Meeting Notes

May 21, 2020

Attendees: Juliette Fernandez, Grant Harris, Bill Radke, Tasha Harden, Cass Walker, Darrell Kundargi, Ariel Macmillan-Sanchez, Peter Burck

[Please note the additional comments from **Randy Stewart** added below by Peter Burck on 6/10/2020.]

1) Review and adjust agenda

No changes to agenda

2) Update of Statistical Analysis of Glenn Well Pumping and Mitigation Well water pressures

Randy was unavailable for today's call. He revised his statistical analysis and distributed the updated results to the group via email on May 19. Randy concluded we have a direct statistical link between the activities at the border wall well (Glenn Ranch Well) and the Mitigation Well at San Bernardino National Wildlife Refuge. Pumping can be detected at a time lag of one month. Additional weekly data are needed from Glenn Ranch Well, Mitigation Well, and Slaughter House Ranch to continue refining these models at a resolution less than one month.

Bill said (later in the call) it was helpful for Randy to look at the data. Shutting down Mitigation Well at the refuge so it could be used as a monitoring well was a risk that turned out to be a good idea. Tasha said Randy would like to see the Slaughter Ranch well data. Cass sent it to him. Bill said he would not expect much difference between responses seen at Mitigation Well and Slaughter Ranch Well. He expects the lag time to be similar. Darrell hopes the data from the two wells is in good agreement.

3) Findings to Border Patrol regarding Glenn Well pumping Rate and Timing

Cass mentioned Customs and Border Patrol (CBP) added infrastructure to allow two water trucks to be filled simultaneously at the Glenn Ranch Well.

Juliette continues to receive and pass along water use data. CBP water use has increased from 70k to 200k to 400k gallons/day. The increased use is attributed to greater demand for dust control and warmer/hotter weather. Juliette's contact will ask if there are other reasons for the increased water use. Bill said more border wall construction is occurring to the east and to the west of the batch plant thereby increasing demand for water.

Magnesium chloride is being used to control road dust between Douglas and the batch plant in an attempt to use less water.

One of the water use reports we received showed water use locations in other parts of the state. Some of these locations are at Cabeza Prieta NWR and are not within 5 miles of San Bernardino NWR. Juliette will follow up to get well location information. Bill said he's familiar with the Klump Ranch well which is not too far away to the west of San Bernardino NWR.

4) Overview of Filling Ponds and Effects on Fish Management

Tasha updated the pond water level conditions file on Teams. Not much has changed since the last call. Nine ponds continue to struggle to maintain water levels and nine ponds are maintaining water levels. Two ponds remain empty. Water level conditions currently are pretty good at the four Hackberry ponds containing water. Ben New Pond is doing better now because 30 gpm of water is being piped there from Robertson Cienega (from West Border Well). The water level is dropping at Robertson Cienega because of the diversion of water to the Hackberry Ponds.

Cass is trapping fish and found all three fish species in the Hackberry outflow (chub, shiner, topminnow).

North Pond is being checked for shiner. Fish were salvaged from Ben New Pond and placed in captivity. Now that the water level is back up to barely overflowing, staff plan to return shiner to Ben New Pond during the week of May 25.

Pond rehabilitation work involving cattail removal was done on the east side of one of the Hackberry Ponds. Cattails will be removed from the west side of the pond next week. The excavator can't reach the cattails in the middle of the pond.

Bill mentioned the importance of water spilling out of Hackberry ponds into Black Draw to the habitat and species there.

5) Water Rights Analysis

Office of the Solicitor (SOL) review of Ariel's water rights document is pending. Bill noted the large amount of work Ariel did to sort out the inconsistencies and apparent errors in the refuge's water permits. He is talking with consultants to work with the state to resolve these issues. He needs to do this now because pumps may be installed in wells to maintain flows, and this work must be coordinated with the state. The Division of Water Resources' new legal intern (Ariel's successor), who starts next week, may be able to assist with this effort. Darrell will arrange a call to coordinate efforts with refuge during the latter part of next week.

6) Status of Ongoing Data Collection Effort

Cass said four wells are done in terms of monitoring equipment installation (Middle, Hackberry, Twin, Bunting). Two wells, Hay Hollow and Mitigation, will be done when batteries are installed. A wiring issue involving the solar panels at Hackberry and Twin wells was resolved successfully yesterday. Darrell asked whether any difference in flow was noted after magnetic flow (mag) meters were installed and replumbed. Cass said bucket tests were close to mag meter and outflow results. Secondary pressure readings for Darrell are collected only at Mitigation Well. On Friday, the transducer reading was 2.77 and the secondary measurement was 2.84.

7) Summary Report Status

Joaquin was unavailable for the call today. He currently has most of the pieces he needs for the summary report. Darrell will be writing a section describing the monitoring component and outflow. Peter will contribute the pond water budget analysis. Joaquin will be handing off this part of the project because he's accepted a new position with another federal agency.

8) Pond Water Budget Analysis (to quantify pond water needs)

Peter described his recent progress on the pond water budget and showed the average annual and monthly calculations for Brasher Pond. He'll share the results with Randy to discuss the approach and later with the group. Values for infiltration and overflow will likely need to be validated by refuge staff. Peter will continue to refine the analysis and will incorporate cattail evapotranspiration (ET) in the next iteration. He'll look at the outflows from ponds currently doing well. He'll also use the February measured outflow from the four Hackberry ponds of 7.45 gallons per minute (gpm). Bill offered that there are likely ways to reduce the uncertainty in the analysis by measuring overflows. He said cattail ET data for Yuma, AZ, may be useful despite the lower elevation, warmer temperatures and longer growing season. We also discussed how much pond area cattails cover in a pond. Peter plans to consider several scenarios depending on how much of a pond is covered in cattails.

9) Artificial Propagation

Cass sent 60 shiner to the Sonoran Desert Museum. She has 500 fry now in two tanks. She set up a third tank this morning. Bill will help with protocol once he has access to a scanner. Ariel suggested Adobe Scan phone app as alternative.

10) Pump Installation

Juliette said CBP wants to talk later today, if possible. CBP is working with a contractor to fund pumps at the refuge. Tasha said D&M Well Service provided a cost estimate directly to the CBP contractor, and they are expecting a work order from the contractor to do the job. Juliette mentioned gabions, also. Steve Reagan will be taking over border coordination for Juliette at the end of July when she departs for her new position.

11) Other

None

12) Action Items

- **Juliette** will continue requesting Glenn Well pumping data
- **Juliette** will request well location information for wells CBP is using
- **Randy** will update his statistical analysis when he receives additional pumping data
- **Ariel** will share her water rights analysis once it has been approved by the Office of the Solicitor.
- **Joaquin** will pass responsibility for the summary report to others (probably Peter).
- **Darrell** will write a summary report section summarizing the monitoring effort.
- **Peter** will continue to refine the pond water budget analysis.
- **Cass and Bill** will continue working on artificial propagation planning and protocols
- **Peter** will compile meeting notes and post on Teams for the group to edit
- **Peter** will send out Teams invitation to the group for our next meeting tentatively scheduled for the morning of 6/4
- **Cass and Tasha** will gather outflow data to assist with water budget analysis.

13) Schedule Next Meeting

We will try to schedule the next water team meeting early in the day on Thursday, June 4. The proposed time is 9 a.m. Mountain time / 8 a.m. Arizona time.

Randy Stewart's Comments from 5/22/2020 (added by Peter Burck on 6/10/2020)

Hi Peter,

My apologies for not being able to make the call yesterday. I do appreciate the notes. I do want to add a few things to the discussion.

As you read, and at the moment, the decline in pressure readings is not as pronounced at the weekly time step as it is at the monthly time step. It is still declining negatively. However, given the subtleties in the decline, coupled with weekly variation in pumping, the negative link is not as pronounced and it will require additional data to determine if we can "statistically" detect a decline less than a month. This applies to both Mitigation Well and Slaughter House Ranch.

It is also pleasing to read that what Cassondra is doing is working, spawns are occurring, and recruits surviving. Though the following is more relevant to future work, it would be helpful to understand how many eggs are produced per spawn, how egg production relates to body size, the total number of spawns per spawning pair, and some determination of predation rates of progeny post-spawn. Additionally, it would be helpful to know how water temperature manipulations, photoperiod, and diet affect propagation success. Though some of the above is likely familiar to those that spawn fish or even highlighted to some degree in the protocol that Bill plans to share

for Red Shiner, others might not be so much. The other information will allow someone like me to understand the compensatory recruitment response of beautiful shiners to mortality, essentially, how does the number of eggies/ recruits vary with density-dependent forces and how will something like this play in population regulation? Answering questions such these mentioned above is critical to develop a "species-specific" propagation technique and eventually a program intended to maximize spawning success. However, the work does not stop after propagation. It really only begins. We must quantify post-stocking survival and contribution (i.e., stocking success) to understand how the number of fish produced in captivity and released annually survives, grows, and contributes to the population as part of our effort to "supplement" poor/low recruitment in refuge ponds. For example, follow one of these links if you want to know more.

https://www.researchgate.net/publication/271326808_Using_an_experimental_manipulation_to_determine_the_effectiveness_of_a_stock_enhancement_program

https://www.researchgate.net/publication/277133683_Growth_and_contribution_of_stocked_channel_catfish_Ictalurus_punctatus_Rafinesque_1818_The_importance_of_measuring_post-stocking_performance

https://www.researchgate.net/profile/Kenneth_Leber/publication/258846886_A_Responsible_Approach_to_Marine_Stock_Enhancement/links/0c9605293902fae04a000000/A-Responsible-Approach-to-Marine-Stock-Enhancement.pdf

The idea behind this is that if we stock 500 individuals in a single pond, 10% survive, and the population does not grow, then we invested a lot in cost (effort) for little return. The balancing act is what we call "responsible stock enhancement" and why it is important to develop these strategies (See links above). Though much of this is to add to the discussion and intended to advance conversations that will take place at a later date, I thought that it would be helpful to insert them here and at the beginning of all of this for people to keep in the back of their mind.