

UPPER YELLOWSTONE WATERSHED GROUP

PARK CONSERVATION DISTRICT

*General Meeting
May 10th, 2018 at 7:00 PM
St. John's Church, Emigrant*

-MINUTES-

PEOPLE PRESENT: (32 people signed in, others were present that did not sign in or was unable to read handwriting)

Ashley Lowrey, Watershed Coordinator
Patrick Hutchins, USGS
Druska Kinkie
Max Hjortsberg, PCEC
Mike Bias, FOAM
Paul Chalfant
Alex Sienkiewicz, FS Yellowstone RD
Abby Nelson, FWP
Mary Nelson
Wendy Riley, PCEC
Gardner Imhoff
Art Burns, UYWG Vice Chair
Mark Lermbert, Watermark
Wendy Weaver, MARS
Gayleen Malone, PCD
Jeremy Brown

Adam Sepulveda, USGS
Rick Wollum, Anglers West
Brant Oswald, FOAM
Jason Fleury, Trout Chasers
Diane Chalfant
Scott Opitz, FWP
Nicholas Argyrakis, FOAM
Morgan Squires
Roger Nelson
Henry Kassiske
Brogan Ballard, Yellowstone River Out.
Lennae Guyer, Dome Mountain Ranch
Josh Mills
Whitney Tilt, Mt Sky Guest Ranch
Marty Malone
Paul Robertson, Sage Lodge

Jacque Nelson called the meeting to order at 7:10 pm.

Adam Sepulveda and Patrick Hutchins, U.S. Geological Survey, Northern Rocky Mountain Science Center: PKD – Proliferative Kidney Disease

They are working on communicating to a broader audience, other than just the scientific community. Their goal is to educate the broader community in the local area in order to create a space for dialogue. Please call with questions or concerns any time. They created an official FAQ sheet as a communication tool about summarizing what they know. USGS works with partnering agencies to provide science and knowledge. They see decision making as a three legged stool – decision making is difficult, 1) Science, 2) Management, 3) Socio-economic. The slide presentation presented today will be available on the Watershed Group Webpage, along with the FAQ.

They have learned a lot in the last 1.5 years about PKD, but also realize they have a lot yet to learn and that it is complicated. Currently working to get together the tools to predict when a fish kill will occur, but need more time, a few more years. PKD is an emerging issue throughout the west, it is not going away, they anticipate to continue seeing fish kills across the west in the future. Patrick is primarily a geneticist, and is looking at how we are using genetics to answer ecological questions.

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A brief history of PKD: 1920s – Present in Europe, 1960 – probable case in N. America, 1981 – 1st PKD in U.S. (Idaho), 1990 – PKD related mortality in Montana, 1999 – *T. bryosalmonae* identified as PKX, 2016 – Yellowstone mass mortality, 2017 – subtle Yellowstone Mortality.

PKD refers to the disease state, while PKX refers to the parasite *bryosalmonae*. Proliferative kidney disease (PKD) is a disease of salmonid fish caused by the endoparasitic myxozoan, *Tetracapsuloides bryosalmonae*. All salmonids appear to be susceptible, but understanding of the disease is based largely on studies of rainbow trout. Clinical PKD is characterized by a massive inflammatory response caused by cells proliferating in the kidney and spleen in salmonid fish infected with *T. bryosalmonae*. However many salmonid fish infected with *T. bryosalmonae* do not develop clinical PKD, especially when water temperatures are below 9° C. Thus, occurrence of *T. bryosalmonae* in fish or in the water does not mean that a fish will develop clinical PKD and die. Fish with subclinical infections may also be able to carry the parasite indefinitely, allowing the continuous production of spores. *T. bryosalmonae* is a eukaryotic myxozoan parasite in the phylum cnidaria (the same phylum that contains coral and jellyfish). It has a complex life cycle, infecting fish and bryozoans and having both endoparasitic and spore-like planktonic life stages associated with both fish and bryozoan hosts. PKD has been recognized since the early 20th century, but the disease source of PKD was a mystery until 1999 when *T. bryosalmonae* was identified as the causative agent. Prior to its identification in 1999, the organism that caused the disease was simply referred to as the proliferative kidney organism “X”, hence PKX. However, the disease-causing agent is now referred to by its scientific name, *Tetracapsuloides bryosalmonae*. Bryozoans are sessile, colonial, aquatic invertebrates that are found throughout the world in both marine and freshwater systems. Freshwater bryozoans (Phylactolaemates) generally experience optimal growth at temperatures between 15-28 °C (59-83 °F; Wood 2009). Phylactolaemate populations are often subject to seasonal dynamics: a spore-like statoblast (a reproductive body comparable to a seed) affixes to a hard substrate and establishes a colony, the colony grows throughout the warm season and produces new statoblasts. The colony then dies in the cold months and the population is perpetuated with new statoblasts. However, some species are capable of overwintering as a mature colony.

Is *Tetracapsuloides bryosalmonae* an invasive species? We do not know and likely will never know if *T. bryosalmonae* is an invasive species in the Yellowstone River. By definition, an invasive species is one that has been introduced to an environment where it is non-native, or alien, and whose introduction causes environmental or economic damage or harm to human health. Prior to August 2016, PKD or *T. bryosalmonae* had not been documented in the Yellowstone River subbasin. To learn about PKD and *T. bryosalmonae*, the US Geological Survey’s Northern Rocky Mountain Science Center has partnered with the USFWS Bozeman Fish Health Center and Montana FWP to develop molecular tools for *T. bryosalmonae* surveillance and to use these tools to describe the occurrence and distribution of *T. bryosalmonae* in regional rivers. Using these molecular tools, we have detected *T. bryosalmonae* DNA in seemingly healthy salmonids in most major rivers and tributaries in western Montana. We have also detected *T. bryosalmonae* DNA in archived fish samples collected in 2012 in the Yellowstone River near Big Timber, MT. PKD was also documented in Middle Creek Reservoir (Smith River drainage) in 1990 and 1991 and in Cherry Creek (Madison River) in the 1990s. These data indicate that *T. bryosalmonae* is broadly distributed and has been in the region for decades. We do not have data to determine when *T. bryosalmonae* first inhabited the region so cannot definitively label *T. bryosalmonae* as a

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native or invasive species. Regardless of *T. bryosalmonae*'s status as a native or invasive species, it critical to clean, drain and dry all gear and equipment since unintentional movement of the parasite could extend the geographical range of the disease and facilitate novel and potentially deadly combinations of fish, bryozoan, and parasite strains.

Where in Montana, other than the Yellowstone River, has PKD and/or *Tetracapsuloides bryosalmonae* been documented? In Montana, PKD was first documented in cutthroat trout in Middle Creek Reservoir (Smith River drainage) in 1990 and 1991 and in Cherry Creek (Madison River) in the 1996. We used molecular DNA tools to screen fish tissue samples collected in 2016 and 2017 for presence of *T. bryosalmonae* DNA. It is important to underscore that presence of the parasite's DNA in fish tissue is not indicative of presence of the clinical PKD disease or fish mortality and that our findings likely do not represent the full extent of *T. bryosalmonae*'s distribution. Major tributaries where we have detected *T. bryosalmonae* DNA include: Big Hole R., Bighorn R., Blackfoot R., Boulder R., Clark Fork R., East Gallatin R., Flathead R., Gallatin R., Jefferson R., Madison R., Middle Fork of Flathead R., North Fork of Flathead R., Missouri R., Ruby R., Shields R., Smith R., Stillwater R., Sun R.

Where else has PKD resulted in fish kills and how do they compare to the Yellowstone fish kill? The magnitude of the Yellowstone River fish kill appears to be unprecedented, as no other published report or study describes events where > 1000 fish died. Because the population size of Mountain whitefish in the Yellowstone River is not known, it is unclear what percent of this population died. Reports from fish farms and hatcheries do indicate instances with 85% - 100% mortality. In North America, PKD fish kills have been infrequently reported in technical or peer-reviewed literature.

Since *Tetracapsuloides bryosalmonae* occurs in other rivers in the region, why did a PKD fish die-off only occur in the Yellowstone River? We do not know. Many regional rivers had stressful (e.g., high water temperature and low discharge) conditions similar or worse than the Yellowstone River in 2016, yet there were no documented PKD fish kills. Despite higher flows and cooler water temperatures in July, another documented PKD fish kill occurred in the Yellowstone River in 2017, though mortality was much lower. This unanticipated die-off further underscores how little we understand about PKD disease dynamics. Taken together, these results indicate that *T. bryosalmonae* is widely distributed and suggest that warm temperatures and low flow conditions cannot *alone* explain PKD-caused fish kills though these stressful conditions are clearly important to PKD. Currently, we are collecting data to test two hypotheses that may explain why the Yellowstone River was more vulnerable to PKD. First, we are testing if variations in infection patterns across rivers are a result of different genetic types of *T. bryosalmonae* and that genetic types in the Yellowstone River are distinct and potentially more virulent. Second, we are testing if bryozoan hosts for *T. bryosalmonae* are more abundant in the Yellowstone River, though we do not know what past densities of bryozoans were like. We anticipate that there will not be a single answer that explains PKD fish die-offs in all places across all times.

Will a PKD fish die-off happen again in the Yellowstone River or other rivers? We don't know, but suspect that future die-offs are possible.

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Why did PKD primarily kill Mountain whitefish in the Yellowstone River? Why not trout? We don't know why PKD primarily killed Mountain whitefish in the Yellowstone River and also in the South Fork of the Snake River (ID). No previous research has assessed Mountain whitefish vulnerability to PKD.

What research is being done to prevent, predict, or control PKD?

Our collaborative team is currently doing research on the following topics related to PKD:

1. Testing if variations in infection and disease are a result of different genetic types of *T. bryosalmonae* and that the 2016 outbreak was the result of a host-specific type.
2. Validating environmental DNA (eDNA) tools for *T. bryosalmonae* surveillance and associate eDNA measurements with infection prevalence based on lethal fish sampling.
3. Developing and validating quantitative PCR (qPCR) methods to characterize infection status and benchmark method against histological measures of disease state.
4. Identify bryozoan species that act as hosts for *T. bryosalmonae* at sentinel sites in the Yellowstone River.
5. Collect temporal data at sentinel sites on the target bryozoan hosts, fish hosts, parasite eDNA and environmental parameters that will eventually feed into epidemiological models to predict PKD outbreaks.

We are also collaborating with European PKD experts (B. Okamura and H. Hartikainen) to better describe *T. bryosalmonae* genomics and the factors that influence the contemporary distribution and potential virulence of different *T. bryosalmonae* genetic types.

How can private citizens and businesses help?

- Communicate the need for PKD research to local, state and federal lawmakers and legislative staff.
- If you see something suspicious like dead fish, disease signs or fish behavioral changes, please contact Montana FWP.
- Conserve water, low water causes stress to aquatic communities
- Minimize stress to fish during any fish kills.
- Follow aquatic invasive species prevention and containment best practices and clean, drain, and dry all gear and equipment.

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Druska Kinkie: Discussion of American Prairie Reserve and BLM Bison Proposal, and Animal Disease Traceability (ADT) update.

The American Prairie Reserve (APR) submitted a proposal to expand bison grazing on their BLM allotments in Central and Northeast Montana. In response the BLM is planning to analyze all of the allotments under one Environmental Assessment (EA) and is seeking public comment. Comments will be accepted until June 11th. Druska has proposed that the Watershed Group draft a letter with comments and vote whether to submit it at the June 7th meeting. The proposed action would modify the APR's grazing permits on 18 allotments by changing the class of livestock from cattle to bison, allowing for year-round grazing, changing external boundary fences to electric and removing internal fences. Watershed Group proposed comments for the letter include the following:

- 1) Please do an EIS
- 2) Ask them to identify and assess exactly what disease control measures the bison will be subject to.
- 3) Please assess impacts to fire management/suppression
- 4) Assess the adequacy of the exterior fencing proposed.
- 5) Assess impacts to adjacent landowners/communities from escaped bison.
- 6) Ask them to consider all available range management studies conducted on the Flying D Ranch and within the GYA
- 7) BLM should assess the costs of reinstalling interior fencing and maintaining solar powered exterior should the experiment fail.
- 8) Ask them to avoid using the word "indigenous animals"

COMMITTEE UPDATES:

- A. Weed Committee: No update given
- B. Irrigation Committee: No update given.
- C. Range Committee: No update given.
- D. Stream Stabilization Committee: No update given.
- E. Wildlife Committee: No update given.

COORDINATOR UPDATES:

- A. SNOTEL site updates
- B. Riparian Grazing Workshop

AGENCY UPDATES:

Scott Opitz, FWP Fish Biologist: Spring sampling is done, they have obtained population estimates at Corwin, but won't have kill estimates because of high water. Unofficially, large numbers of younger fish, return of bigger browns. They repeated Mallards, looked at white fish numbers, but don't have results back yet. All data goes to FISHMT on the state FWP website, can search by stream or map – data records from 1950s to present.

Abby Nelson, FWP Wolf Biologist: average wolf numbers for the year have been collected – about comparable to previous years, although numbers do change as a result of denning etc. Capture efforts were successful, put collars on two new packs, and one recollared pack from Cinnabar.

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Alex Sienkiewicz, FS District Ranger: Currently checking roads and culverts and infrastructure. There is a wash out near 6-mile. Watershed plan to replace old culverts in the Shields. Logging/thinning on East Boulder.

PUBLIC COMMENT:

Marty Malone: ask the State for money to help support the USGS research around PKD.

Druska Kinkie: There are almost no ag producers here tonight, need to even up the demographic.

April MINUTES:

Druska made move to approve minutes, Art Burns seconded, motion passed.

ADJOURN:

The meeting adjourned at 9:05pm.