RIPPLES IN THE GRANDE RONDE

WINTER EDITION 2017

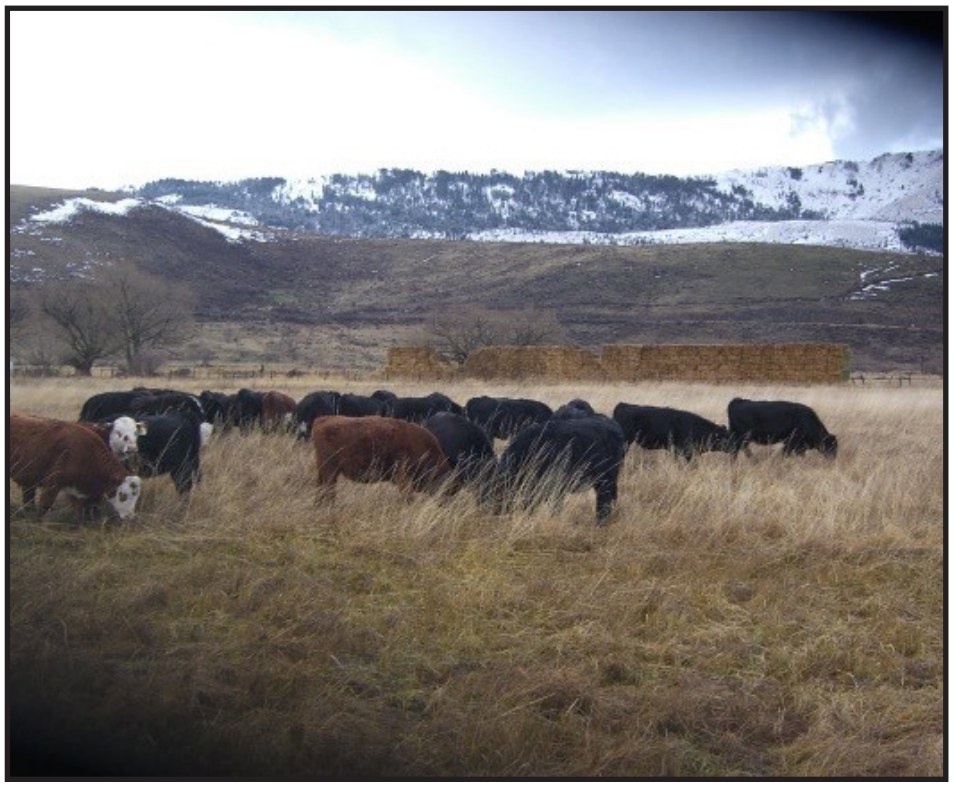
RIVERS UNITING NEIGHBORS·QUARTERLY NEWS FROM THE GRANDE RONDE MODEL WATERSHED

RANCHING FOR BIODIVERSITY

Holistic Planned Grazing to Improve Species Diversity

by Tony Malmberg, *Union County Rancher*

My interest in biodiversity began on our ranch in the foothills of the Southern Wind River Mountains near Lander, Wyoming, where I ranched for 30 years. Elevation ranged from 5,800 to 8,000 feet, with more than 20 miles of perennial and ephemeral streams. As part of our management plan, we used grazing as a tool to promote willow growth and beaver habitat, but we had not always ranched in this way. Growing up, my grandfather used to say that cattle did better on a mixture of grass. What I did not realize at the time was that he was refering to the importance of biodiversity. Thinking about biodiversity shifted my awareness beyond the need for cattle to graze on a "mixture of grass." Mammals, birds, predators, and millions of species in the soil are part of an interlinked "biodiverse" system in which more diversity produces a more resilient system.



Cattle wintering at Tony's Union, Oregon, property.
(Photo: Tony Malmberg)

My exploration of biodiversity and its benefits arose in large part from observing the consequences of my actions. For example, I once dynamited a beaver dam that was making a horse crossing difficult. The next day, I noticed that the water was running muddy and the creek banks were caving in. The consequences of erosion, a lowered water table, and less riparian area production that resulted from blowing up the beaver dam made me realize the value of living with beavers and their dams. With this commitment, the creek became a fence rather than something I could cross. My changed attitude resulted in an extra pasture, a higher water table, less erosion, and more grass on the sub-irrigated riparian area. I learned that the hardest part of change is shifting my mindset. The positive results energized me, and I began to curiously watch my land in a new way.

As beaver inhabited larger segments of Twin Creek, I began noticing more biodiversity. We had seen an occasional moose during the winter, but as the beaver population increased, we gained a resident moose population. The University of Wyoming and Wyoming Game and Fish Department conducted a study on our ranch to see how beaver habitat affected bird populations. They found that the bird population increased by 50 percent and the number of species jumped by 70 percent. These key indicators of more species reflected a changing habitat. Blowing up the beaver dam was my first realization that by removing a species, I might damage the stability of my land and my profitability.

Once I realized the benefits of maintaining the beaver population, I became more aware of biodiversity of all sorts. In 1989, we were moving cattle and passed through a prairie dog town, and I noticed a coyote lying quietly beside a prairie dog hole. After moving the cattle, we retraced our steps past the prairie dog town. The coyote was patiently waiting in the same spot, hunting prairie dogs. As a result of that observation, I stopped hunting coyotes so that they could keep hunting prairie dogs. With planned grazing and a predator-friendly policy, prairie dog colonies stay small. The smaller colonies of 20 to 40 prairie dogs seem to

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Cattle graze a pasture that has been invaded by Scotch Thistle on Tony's Cricket Flats property (top). The same pasture post-Holistic Planned Grazing (bottom). (Photos: Tony Malmberg)

move around from place to place, particularly when I place a salt block in an active town. When the prairie dogs relocate, the western wheat grass explodes around their holes. In this way, applying the tools of animal impact and grazing with prairie dogs increases grass production.

This same awareness of diversity applies to how I manage weeds. If I spray and kill a weed, then I am moving succession backwards to bare ground. Once we have moved succession backwards to bare ground, we must again populate that ground with annuals and weeds until the soil and plant complexity can support perennial plants. With proper time and sequencing of animal impact and grazing, the succession process will move toward a perennial grass plant community. For example, Canada thistle cannot stand hot season grazing. Planning timing to graze riparian areas during the hot season every three to five years keeps Canada thistle in check. I would rather have cheat grass, Canada thistle, knap weed, or leafy spurge than bare ground. With these weeds, I have plant material to place on the soil surface, which creates mulch and incubation sites for perennial grass plants.

Based on my observations on the ranch, I became interested in and took a course on Holistic Management. Holistic Grazing intends to mimic nature and graze in the same way that our grasslands evolved. Every grassland in the world evolved with large herds of grazing animals hunted by packs of predators. This natural grassland ecolgy involves an intense period of grazing, dunging, urinating, and hoof impact followed by a long period of rest.

After taking the course, I stopped my traditional practice of season-long grazing and started a simple deferred rotation plan. I grazed two herds of 1,000 pairs and 1,200 yearlings on 50,000 acres. We used temporary electric fencing to increase livestock density and reduce grazing periods to fewer than 21 days per year. Eventually, we reduced that time to fewer than 10 days to stay ahead of the fly cycle. The heal and horn fly was our primary concern, and it has a 10-day life cycle. By moving every 10 days, the cattle were gone before the flies hatched. With no need for pesticides, the fly larvae survived to recycle the manure.

When I first started running larger herds and moving cattle more frequently, I was concerned about increased labor cost. I learned that when we concentrate cattle, we concentrate labor, which makes my labor force more efficient and reduces the overall demand for labor. Improved production, better land health, recovered riparian areas, and increased biodiversity resulted from the core management practices of:

1. Concentrating cattle numbers (livestock density);
2. Reducing the length of time in one place (time);
3. Increasing the time of rest (plant recovery); and
4. Varying when I return to a specific piece of ground each year (timing).

Riparian areas, which composed 3 percent of the surface area of our ranch, responded quickly to these changes in management practices. That 3 percent of surface area facilitated 35 percent of our production. The more we slowed down water flows and the higher we raised the water table, the higher our productivity. Increased biodiversity of willows, beaver, moose, and songbirds reflected increased production and profitability.

Reconnecting our stream to the floodplain provided the best drought insurance we could buy. The connection of the stream to the floodplain maintains a sub-irrigated riparian area, which ensures that there will be no drought.

Despite all of these benefits, most of my rancher neighbors in Wyoming remained guardedly skeptical of my new management practices. Some adopted our fencing and livestock water practices but not the intense grazing planning. Several neighbors and land managers noticed the healing riparian areas. Changes on the uplands were more subtle, but they would appreciate the results as I pointed things out,

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IT'S A BIRD! IT'S A PLANE!

by Connar Stone, *GRMW Staff*

From the beginning of time, human beings have been fascinated with the idea of flight. There is something about watching an object soar through the air that has tickled the fancy of aeronautical enthusiasts for centuries. From Leonardo da Vinci's Flying Machines of old to modern-day commercial airliners, our captivation with flight remains as unwavering as our inclination to build and innovate. During the past decade, there have been many extraordinary advancements in aerial technologies, but none have been quite as rapid or ingenious as the development of drones. Drones come in all shapes and sizes and have become very popular during the last decade. The term "drone" usually is used interchangeably with the term "UAV (Unmanned Aerial Vehicle)," but when someone says "drone," they typically mean multi-copters. Multi-copters are the multiple-propeller drones that you might see flying over a football game or a graduation ceremony, and they are typically equipped with some kind of camera to capture photos and video.

Although the majority of these drones are employed as an effective media tool, they also serve other purposes. Domino's Pizza in New Zealand already is hard at work to develop a drone designed to deliver their disc-shaped pies to consumers. Search and Rescue teams across the U.S. have started adapting thermal imaging to drones in order to quickly locate lost persons. Similarly, we at the Grande Ronde Model Watershed will be adapting a thermal camera to one of our own drones. It will be used to procure thermal imaging of the many streams and rivers in the Grande Ronde River Basin. This technology will allow us to identify warm or cold pockets of water that could be beneficial for the many aquatic species that call the basin home. We also use drones to gather images for high-resolution orthomosaics (an image composed of hundreds of individual photos stitched together). These images have a ratio of about a tenth of a foot to one pixel, meaning the orthomosaics we produce could identify something as small as a smartphone from the air with relative ease. We can also create a Digital Surface Model (DSM) from these same images, which show elevation data that can be used to create a three-dimensional model of a project, beaver dam, log jam, or any other feature of interest. We fly many of these

Aerial landscape of Bird Track Springs taken in February 2017 by Jesse Steele during an ice flow on the Upper Grande Ronde River. The ice jam in the photo stretches for nearly a mile.
(Photo: GRMW)

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Ripples in the Grande Ronde is funded by the Bonneville Power Administration and the Oregon Watershed Enhancement Board

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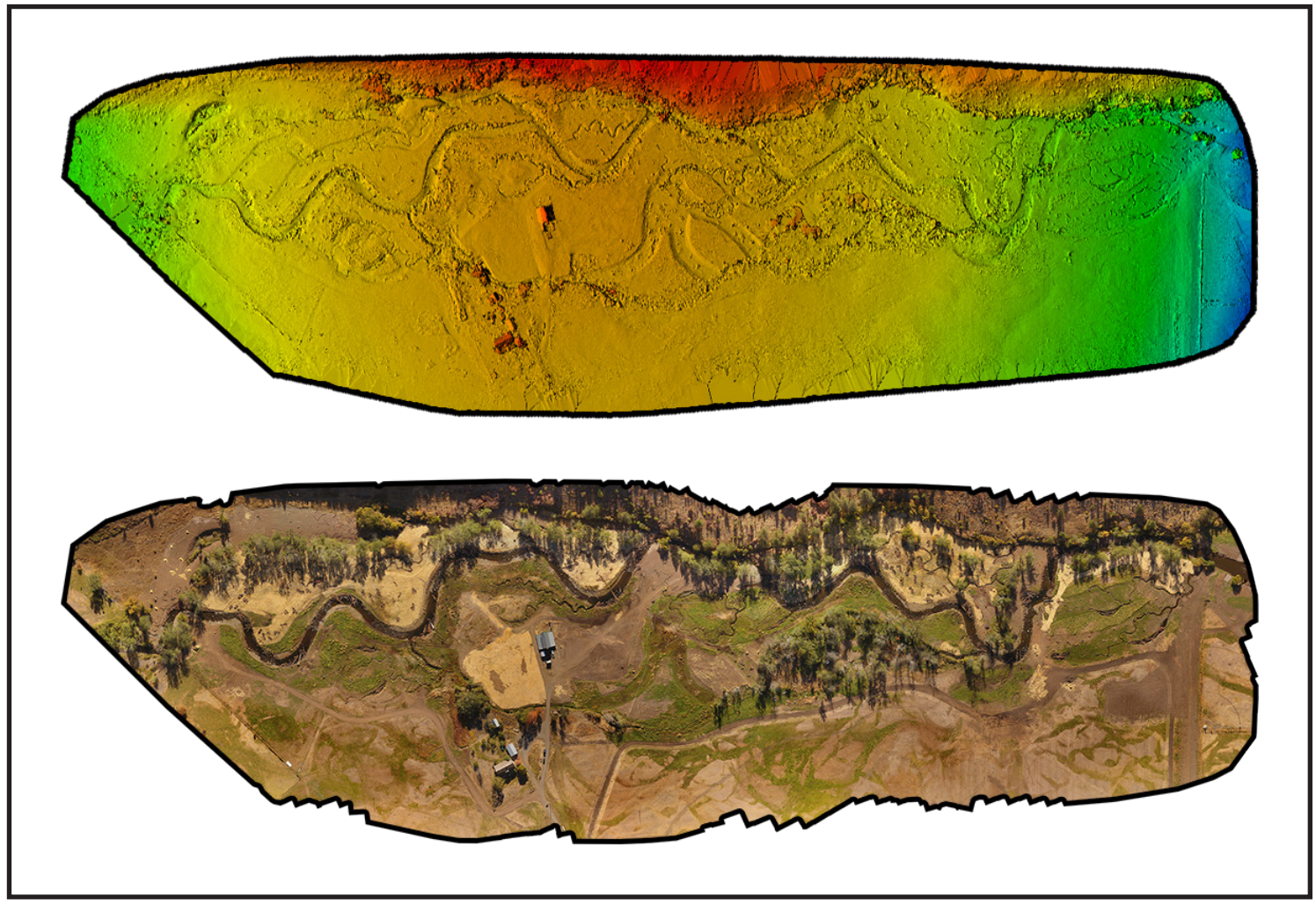
projects several times to gather more data as improvements are made. The drones have become an effective monitoring tool, allowing us to track restoration progress years after project implementation.

We think of drone technology as a great advancement in aeronautics, and it is. But contrary to popular belief, multiple-propeller drones are less efficient than single-propeller helicopters and require more adjustments to keep the unit stable during flight; however, their straightforward design provides for masterful control, as the user can adjust the speed of each propeller in flight. Helicopters achieve this control by tilting the main propeller. This need to tilt the main propeller puts a heavy mechanical requirement on the design and considerably limits the adaptability of any remote-controlled (RC) helicopter. On the other hand, the design of a multi-copter is so simple that you could use a few wooden sticks to hold the motors in place, and the multi-copter would still fly, which would be laughable to attempt with an RC helicopter. It is because multi-copters are so easily adapted for an infinite variety of tasks that they have become one of the greatest modern achievements in aerial technology.



Orthomosaic and DSM composed of 470 individual images rendered using Pix4D Software. Gathered in September 2016 by GRMW staffers, Jesse Steele and Connar Stone. (Photo: GRMW)

New advancements in drone technology are not the only factors driving change. New legislation passed this year has consolidated many of the small UAS rules and streamlined the regulations governing drones. Some rules have been reduced to simplify wording, while others have been lifted or changed to lessen restrictions on operating a drone commercially.

Without a doubt, drones have become an ordinary facet of the modern world, and pilots are finding new and exciting ways to integrate them in our everyday lives. Drone racing has become a fast-growing hobbyist sport for drone enthusiasts. Some farmers are looking to drones like the Agras MG-1 for spraying their crops. Many real estate and photography professionals now are using drones to obtain outstanding aerial images. With so many ways to adapt a drone, perhaps we should all be asking, "What could I do with a drone?"

If you wish to fly a drone as a hobby, then there is no required license, but if your drone's total weight is greater than 0.55 pounds, then you must register it for a $5 fee. The easiest way to register a drone is to go to www.faa.gov/uas. Once the fee is paid, you will receive a registration number, which you then can use to mark all of your drones. For more information about drones, visit www.faa.gov/uas.

There are a few other rules that should be mentioned concerning the appropriate operation of drones. First, you should never fly a drone within five miles of an airport without first notifying the airport and air traffic control. Airports use very sensitive radar to track incoming and outbound aircraft, and an unidentified aircraft can lead to the shutdown of normal operations. Second, you should never fly your drone in proximity to a fire (or any emergency for that matter). There are a number of complications and concerns posed to fire crews when another aircraft is operating in the vicinity of a fire. Many times, helicopters and other firefighting aircraft will remain grounded if a drone is spotted in the air. The possible ramifications of flying a drone near a wildfire include thousands of dollars in fines and possible criminal prosecution. Third, avoid flying over heavily populated areas, city streets, power lines, and buildings. Flying a drone near these obstacles may lead to bodily harm as well as harm to your drone, so it is best to avoid them. Finally, always make sure you have permission before you fly over private property, whether over a stream or over land. If you plan to fly over public land, then it is wise to make sure the land managers are aware of your plans and schedule. ■

Meet the Board...

OUR NEWLY ELECTED CHAIR

Susan Roberts

by Jeff Oveson, *GRMW Director*

Not many people can say that they were born in the small village of Minam, Oregon, but Susan Roberts is one of them. Minam was a mill town in those days, and Susan's father, Ivan, worked at the mill. For those of you who are familiar with the area, the mill was located just west of the Wallowa River/Minam River confluence. Highway 82 has long since been reconfigured so that it passes through much of what was the old mill site. The last mill to operate at Minam was one of three that existed there at one time or another.

According to the April 20, 2009, issue of the *La Grande Observer*, "Logs were hauled out of Minam by rail in the 1930s, and a mill was re-opened by Myron Fleser in 1946. The main office of the Minam Lumber Co. was situated in Wallowa, where some of the mill's employees lived and commuted to work in Minam. Others came from Elgin and from the 30 or so local families. Fleser's mill had record production of more than 5 million board feet in 1950 and employed up to 57 men. The mill operated until it burned down in 1951, as documented in *Gateway to the Wallowas* by Irene Barklow."

When the Fleser Mill burned in 1951, young Susan and her family, including Ivan, her mother, Agnes, and three brothers (Errol, John, and Everett), moved to Diamond Prairie just west of Wallowa. All four children graduated from Wallowa High School and still live in northeastern Oregon. Susan, John, and Everett live in Wallowa County, and Errol lives in La Grande. The Roberts are a Marine family: Ivan was in the famous 1st Marine Division, the oldest, largest, and most decorated division in the United States Marine Corps, and Errol and John enlisted in 1963 and 1966, respectively.

Susan developed an interest in history and government at an early age, an interest that was fostered by the late Don Wilson, a long-time teacher at Wallowa High School, and then later by Marine Colonel Francis (Frank) Riney, her Commanding Officer while she was stationed in Hawaii. After graduating from Wallowa High School, Susan went to business school in Boise and then returned to Wallowa for a few months before joining the Marines on the same day as her younger brother, Everett. Susan confirms that the Marine Corps "really is a brotherhood." Her pride in having been in the Marine Corps and lived the creed "once a Marine, always a Marine" shows in her facial expressions when she speaks about it. Susan spent much of her active duty time in Forward Combat Support, which involved getting supplies to Marines on the ground fighting in the Vietnam conflict. Susan says the process of efficiently and rapidly supplying troops required completing a mountain of paperwork, a task that happened far away from the action without the technological advancements in communication we take for granted today. Unlike today, women Marines mostly were stationed out of harm's way when Susan was serving. Susan remains adamantly opposed to women serving in combat.

After her Marine service, Susan returned to northeastern Oregon to live in Enterprise, where she became aware of an issue that her neighbor had with the City of Enterprise. He wanted to build a fence around his yard to provide a safe barrier around his children as they played, but the City was reluctant to allow him to do so because of zoning restrictions. Susan attended a City Council meeting to observe discussion of the issue, becoming familiar with the restrictions and mechanisms for dealing with them. Most of us would have had enough of the bureaucracy right then and there, but Susan found it interesting and began attending City Council meetings regularly. Soon, she was on the budget committee, then became a Council member, and finally was elected Mayor of Enterprise, a position she filled for eight years.

On January 1, 2009, Susan started her first term as a member of the Wallowa County Board of Commissioners. She felt prepared to assume the post because she had spent the previous year attending all of the commission, budget, and special meetings to gain familiarity with the issues she would encounter if she were elected. She was reelected in 2012, and after running unopposed in fall 2016, she started

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Susan Roberts, Wallowa County Commissioner Chair and GRMW Board of Directors Chair.
(Photo: Wallowa County Commissioners)

Frozen Out

The Effects of Anchor Ice on Winter Habitat for Fish

by Alex Borgerding, *GRMW Staff*

During the winter months, low temperatures, low flows, and changing precipitation patterns transform riverine ecosystems. These changes create harsh habitat conditions that challenge the survival of all lifeforms. One of the most striking physical impacts of frigid temperatures is the formation of ice on or around streams. But did you know that ice also forms on stream bottoms? This subsurface ice is called anchor ice.

Formation and Effects

Anchor ice forms on river bottoms, attaching to substrate as opposed to forming on top of the water. You may be asking yourself how this kind of substrate formation is possible if ice is less dense than water. The combination of subfreezing temperatures and fast-moving shallow waters, typically in mid-elevation reaches, creates an environment in which anchor ice may form. Higher velocity rolling water prevents stratification of the water column, which inhibits formation of surface ice. When air temperatures are subfreezing and surface ice is not able to form, the entire water column is cooled to temperatures below 0°C in a process called supercooling. In supercooled water, free-floating ice crystals called frazil begin to form. Frazil has a sticky texture, and when it comes into contact with another frazil crystal or any unheated underwater object (for example, substrate materials), it adheres to that object and immediately creates an anchor point. Once this point is established, the ice formation grows. Depending on temperatures, the ice formation process can take several days or, in cases of extremely low temperatures, it can form overnight. During formation, anchor ice may combine frazil ice crystals with sediments, which produces a brownish color. Otherwise, the coagulation of primarily many small ice crystals results in a milky appearance of the anchor ice. The shapes of anchor ice formations vary, from round snowballs that can blanket a stream bed to thick anchor ice dams that have the ability to temporarily block flow, resulting in significant water level fluctuations.

Water level fluctuations and damming are not the only disturbances caused by anchor ice. Breakup of anchor ice, which can occur during spring melt or when the buoyancy of the ice exceeds its adhesion, creates scour and downstream redistribution of sediments and other substrate materials. These breakup floods can carry two to five times more sediment load than open-water floods.

Anchor ice also can take its toll on biological lifeforms. As anchor ice forms, it fills interstitial spaces in the substrate where many species reside or take cover. This process can freeze, smother, or crush macroinvertebrates and other organisms

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Frazil ice crystals cling to substrate, forming anchor ice on a stream near Aspen, Colorado. (Photo: The Aspen Times)

... *continued from page 6,* **Anchor Ice**

either through the formation of anchor ice or by mechanical destruction during its breakup. It also can also form on redds (fish egg deposits), which almost entirely eliminates any chance of survival for eggs by blocking the oxygen-rich current that flows through the redd and by scour when the ice breaks up.

Anchor Ice and Overwintering Habitat

Winter is a time of increased vulnerability for fish that overwinter in icy streams. A fish's body temperature changes with the temperature of its external environment. Cold temperatures in the winter slow metabolic rates, which enables salmonids and other fish to survive for prolonged periods of time with little to no food by relying mainly on energy reserves stored in their bodies.

When temperatures start to drop in the fall, fish begin to seek out habitats that allow them to minimize energy expenditures and that provide protection from environmental variation. Oftentimes, deep, low-velocity pools offer the perfect microhabitat to support fish throughout the winter. However, as temperatures continue to drop, pool habitats may change due to anchor ice and frazil formation. Frazil and anchor ice events create stressful, harsh conditions that may force fish to move. When a pool starts to fill with anchor ice, the pool's surface is transformed into a higher-velocity riffle-like habitat that often requires too much of a fish's energy to maintain a constant position. In some cases, complete occlusion of habitat forces fish to move many times. Excessive amounts of movement can exhaust fish energy reserves and result in mortality.

Alterations to streams for human use, such as channelization and removal of riparian vegetation, create high-velocity streams with little to no channel complexity. These conditions are prime for anchor ice formation and may increase ice events in these systems. However, researchers also have found increased anchor ice formation in slow-moving, shallow streams, particularly streams with heavy human use and impact. Repeated thawing and freezing of border ice, variable flows, and less insulation provided by snow due to decreased snow accumulation create the conditions for supercooling and bottom-fast freezing. Increases in ice events like frazil and anchor ice formation make the availability of ample winter habitat for fish even more important, as this kind of habitat is vital for a fish's chance to survive the winter season.■

An anchor ice dam backs up water until it spills over the top of this stream in Alberta, Canada, which temporarily but dramatically alters the channel morphology.
(Photo: University of Alberta River Ice Group)

Grande Ronde Model Watershed
Upcoming Board Meetings

Tuesday, February 28th, 2017
5:00 p.m.
Wallowa Community Center
204 E 2nd St.
Wallowa OR 97885

The public is welcome to attend.

Meeting dates are subject to change.
Please call (541) 663 - 0570 to confirm.
Thank you!

... *continued from page 2,* **Ranching**

specifically, how cow trails and roads grassed in and sagebrush died out as the water cycle improved and how fenceline contrasts demonstrated greener and more leafy plants in addition to greater density.

When we moved to Union County in 2010, we bought 585 acres east of Elgin on Cricket Flats, which was in the Conservation Reserve Program (CRP), and 57 acres south of Union. We approached these properties with the lessons we had learned from our holistic management of the Wyoming ranch and have been pleased with the results. The baseline monitoring noted a poor mineral cycle and low plant diversity. In fact, the CRP ground was pretty much a monoculture of smooth brome. After just three years of Holistic Planned Grazing, we improved more than half of the 18 land health monitoring indicators on every transect. Improvement primarily came in the form of more species diversity, increased plant density, and better mineral cycling. The soil organic matter increased by 21 percent, and on average, we increased the stocking rate by 42 percent on the Cricket Flat land and 66 percent on the Union land.

As a result of the increased stocking rate, we used less irrigation water, which allowed us to work with The Freshwater Trust (TFT) to transfer a portion of our irrigation water instream for $405 per acre. We also work with TFT to do a split season lease on our alfalfa field. A split season lease means we irrigate until July 15 and then turn the water back instream for salmon habitat, giving us an income of $270 per acre, which is more than we can produce on a second cutting. We have been interseeding this field in an attempt to develop a plant community that will remain dormant throughout the hot season and begin growth again with the fall rains. Because benefits from Holistic Planned Grazing are leveraged with larger herds, we are working with a neighbor to combine our herds to give us more efficiency in labor and better impact on the land. By working with our neighbors as well as with local agencies and non-profit organizations like TFT, we are able to manage our land for the greatest possible returns.

After 40 years of ranching in Nebraska, Wyoming, and Oregon, my goal is to manage in a way that supports the diversity and complexity of life. Each plant species has different growing seasons, different root zones, and different leaf capacity. Each provides a different pathway for conversion of solar energy into life. By maximizing the pathways of solar energy conversion, I maximize production. I have learned that biodiversity extends beyond my grandfather's idea of the mixture of grass. Each mammal, fish, and insect species expresses something about the habitat niches provided. Indicator species like moose, migratory song-birds, and salmon tell me something about the health of the habitat. If I honor my rule of not suppressing life, then I will be able to see beyond symptoms to address problems. If I continue paying attention to what is missing, then I will continue to look beyond simple systems to realize the optimal functioning of the whole. When I increase biodiversity, I improve land health, community relations, and the profitability of our ranch.■

... *continued from page 5,* **Susan**

serving her third term in January 2017.

During her tenure as Mayor of Enterprise in the 1990s, Susan served on the Grande Ronde Model Watershed (GRMW) Board as an alternate to Larry Christman. More recently, following Mike Hayward's resignation from the Board of Commissioners, Susan agreed to fill his seat on the GRMW Board. In December 2016, she was elected GRMW Board Chair.

Susan is familiar with the history of the GRMW and knows that the addition of Chinook and steelhead to the federal Endangered Species Act (ESA) list was the primary incentive for local governments and tribal leaders, along with landowners and conservation interests, to form the GRMW as a grassroots entity that could retain local involvement in efforts to recover these fish. Susan believes that local economic and social freedoms are restricted by the ESA listing but that people from Wallowa County are willing to work within the new paradigm as long as they are allowed to survive economically. She points out that many long-time residents of the area are intent on sustaining ecological health so that they can pass their heritage along to the next generation.

I asked her what she would like to see in Wallowa County in 10 years. Her response was quick, a sign that she has given the topic a lot of thought: she would like to see a stable population base and enough medium-sized industry to support families and allow future generations continue working in those industries. It is easy to tell that Susan is proud to be from Wallowa County and holds the people who share the county with her in high regard; she says, "People here are willing to work, and work hard."■

Grande Ronde Model Watershed

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