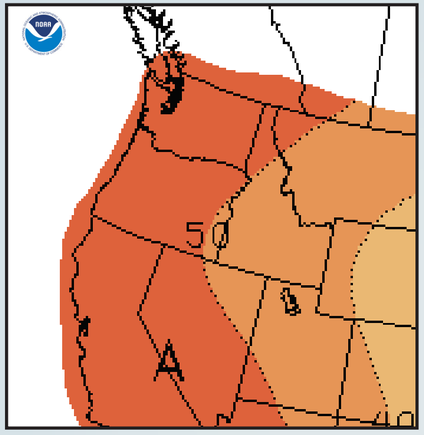
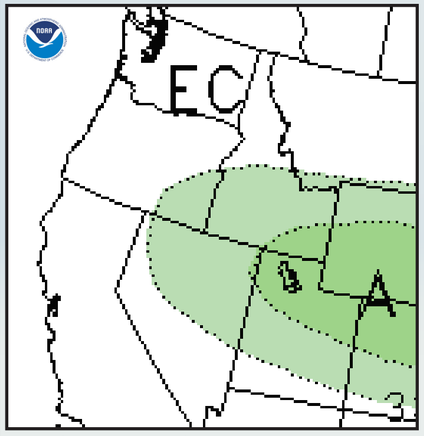
Three-Month Climate Forecast



3 Month Outlook Temperature Probability
(June, July & August)
EC means equal chances for A, N, & B

Discussion: "The June-July August (JJA) temperautre outlook indicates increased probabilities of above-normal temperatures across much of the Continental U.S. and Alaska, with the exception of parts of central U.S. The highest probabilities for above-normal temperatures are nearer the coasts." In this case, Oregon has a high probability of experiencing above-normal temperatures during this time.

- A means Above-Normal
- N means Normal
- B means Below-Normal



3 Month Outlook Precipitation Probability
(June, July & August)
EC means equal chances for A, N, & B

Discussion: "The JJA 2016 Precipitation Outlook favors above-median precipitation for parts of the Rockies and Central Plains, as well as parts of New England." According to predictions, the precipitation for Northeast Oregon is considered to have equal chances for above-normal, normal, or below-normal precipitation.

- A means Above-Normal
- N means Below-Normal

More information: NOAA: http://www.cpc.ncep.noaa.gov/products/predictions/long_range/fxus05.

Anthony Lakes Family Fishing Day

Bring your family to the freshly stocked lake where friendly people will be available to teach children how to bait, cast, and real in their catch. Adults can get tips on basic rigging, fish identification, and casting. Loaner fishing rods will be available to children that do not have equipment.

Saturday, July 9, 2016
9:00 am -1:00 pm

Biggest fish contest with prizes!

8

Contact Tim Bailey for more information- ODFW (541) 962-1829

Funding for this project was provided by the Oregon Watershed Enhancement Board

Powder Basin Watershed Council

2034 Auburn Avenue
Baker City, Oregon 97814
Phone: (541) 523-7288
Fax: (541) 523-7288

www.powderbasinwatershedcouncil.org

Like us on Facebook!
www.facebook.com/powderbasinwatershedcouncil

THE THALWEG

"A line drawn to join the lowest parts along the length of a stream, defining its deepest channel"

SPRING 2016

LIVING IN HARMONY • QUARTERLY NEWS FROM THE POWDER BASIN WATERSHED COUNCIL

Climate Change and Beaver Activity

How Restoring Nature's Engineers Can Alleviate Problems

By Suzanne Fouty, Ph.D.

From the Spring 2008 Beaversprite, 23(1).

Variability is a defining principle of our global climate. Both species and stream/riparian ecosystems evolved with that reality. There have always been years when the rains did not come or years when the rains came too soon or too much. Species responded by developing survival mechanisms, such as wide distributions and variable timing of flight or spawning. These mechanisms combined with complex, widely-distributed, highly stable stream/riparian ecosystems, allowed species to survive even when local groups disappeared due to a disturbance. Beavers were key in the development of these complex and highly stable ecosystems essential for species survival.

Beaver trapping was the first large-scale Euro- American alteration of watersheds.

Euro-Americans arrived on a continent teaming with abundance. Their quest for commodities and wealth drove Euro-Americans to systematically and rapidly log, mine, graze, beaver trap, farm, dam rivers, etc. They systematically and rapidly stripped watersheds of all the features that had provided complexity, stability and water retention capability.

Many of these watershed changes predate photographs or detailed records and scientific studies. Instead, historical documents and journals provide us with snapshots in time of small areas – snapshots often separated by several decades and located at different places within a watershed. Fortunately, the story of stream and riparian ecosystem response to Euro-American land use and the speed at which it happened can be pieced together by combining and comparing information found in the journals of early trappers, later military expeditions, settlers, along with post-settlement historical records and recent scientific studies. These documents reveal that watersheds have undergone multiple, large- scale changes such that conditions bear no resemblance to pre- Euro-American conditions. Responses to climate change and climate variability have been greatly amplified as a result of those changes.

Beaver trapping was the first large-scale Euro-American alteration of watersheds. As beavers were trapped out and their dams failed from neglect, channels began to form in the soft sediments trapped behind the dams. Over time these channels became increasingly connected. Streams and adjacent riparian zones shifted from systems dominated by ponds, multiple channels, wetlands, marshes, and wide riparian zones abundant in fish and wildlife to the simple, incised, overly wide, single-thread channels with narrow strips of riparian vegetation that we know today.

These changes in streams and drainage networks have led to decreased system stability and complexity. The result is lowered water tables, reduced summer base flows, higher flood magnitudes with more frequent flooding, reduced wetland acreage, and greater sensitivity to drought. Our watersheds no longer store and slowly release water, help dampen flood peaks, or sustain stream flows during droughts. Rather the connected and incised river systems now function as sewer lines, rapidly moving water from the upper to the lower watershed, and severely compromising the ability of human and wild communities to successfully deal with climate change and the extreme weather events it brings.

Figure 1. Price Creek, MT (1995). Beaver-dam controlled reach just upstream of Reach 3 in Table 2.

Figure 2. Price Creek, MT (1998). This is Reach 1 (see Example 5), downstream of Figure 1. In both 1995 and in 1998, this section lacked beaver dams.

Rapid restoration of watershed systems is critical for our survival. The return of abundant, actively maintained and widespread beaver dams is critical to that restoration. The following five examples from different areas demonstrate the role that beavers and beaver trapping play in enhancing or degrading stream/riparian stability and complexity, including water storage capability. These five examples show that the beaver's influence is not limited by geography. *Continued on pg. 2*

"Beavers" *continued from page 1...*

Rapid restoration of watershed systems is critical for our survival, and the return of abundant... beaver dams is critical.

Example 1: Upper Mississippi and Missouri River Basins (Hey and Phillip 1995).
The researchers estimate that beaver ponds covered 51,100,000 acres in 1600 compared to 511,000 acres in 1990. They estimated wetlands at 44,700,000 acres in 1780 versus 18,900,000 acres in 1980. This reduction in ponds (surface water stored) and wetlands (groundwater stored) has resulted in a huge loss of flood control, and system stability during droughts and years with high precipitation.

Example 2: Kabetogama Peninsula, Minnesota (Naiman et al 1988).
This study evaluated changes in stream and riparian systems between 1940 and 1986 as a result of beavers returning to the area. Table 1 shows the increase in ponds, wetlands and wet and moist meadows – indicating more surface and ground water storage – during the expansion of beavers and beaver dams. It is certain that dry periods and wet periods occurred during the 46 years, yet over that time the amount of water stored increased.

Table 1: Change in ecosystem type, abundance and water stored in the drainages of the Kabetogama Peninsula, Minnesota between 1940 and 1986.

Cover Type	Area (acres) 1940	Area (acres) 1986
Forest	8668	0
Moist	531	3378
Wet	69	2542
Pond	40	3388
Total	9308	9308

Example 3: Elk Island National Park in east-central Alberta, Canada (Hood and Bayley 2008).
This study examined changes in the amount of open water during dry and wet years between 1948 and 2002 due to the presence, or absence, of beavers. 1950 and 2002 were both very dry years. Beavers were absent in 1950 and wetlands held 61% less open water (565 acres) then, than in 2002 when beavers were present (1467.5 acres). The average pond size in 1950 was 9.6 acres compared to 87.7 acres in 2001 (ponds were measured in 1948, 1950, 1996, and 2001). The 2001 values represent a huge increase in the amount of water stored in the

Example 4: Crane Creek, Oregon (Schaffer 1941).
Prior to 1924 beavers were present in Crane Creek and the meadows had stirrup-high native grasses. The grasses were sub-irrigated by beaver ponds. In 1924 the beavers were trapped out. In 1925 the channel began to incise and by 1935 the channel had deepened 25 feet.

Instead of stirrup- high native grasses, there were clumps of new sagebrush and only sparse remnants of original grasses, showing just how fast channelization and transformation could occur. In 1936 beavers were reintroduced, and by 1938 the water table had risen and the hay meadow production had improved. 1939 was a drought year, yet water was abundant on the ranch with beaver ponds, while absent downstream on the ranch without beaver ponds.

Example 5: Price Creek, Montana (Fouty 2003).
This study showed the impact of the return of beavers and their trapping on water storage. Although beavers were trapped out between 1994 and 1995, the beaver dams inside the cattle exclosure were still largely intact and functional in 1995. In contrast, dams were absent downstream of the exclosure (Reach 1), though remnant dams had been noted during the 1994 survey of Reach 1.

Table 2 shows the average water depths and the variability in water depths (standard deviation) in the three reaches in 1995 and 1998. In 1995, the average water depths in Reaches 2 and 3 (beaver-dam controlled reaches) were twice the average depths in Reach 1 (no beaver dams). In addition, the variability in water depths in Reaches 2 and 3 was greater than in Reach 1, indicating more variable channel bed habitat with possible fisheries and macroinvertebrate benefits. By 1998, the dams in the cattle exclosure had either completely disappeared or were actively breaching. Water levels were now similar in all three reaches.

Table 2. Comparison of maximum water depths in Price Creek, MT in 1995 and 1998. By 1998 all the dams in the beaver-dam controlled reaches had either totally failed or were failing after beavers had been trapped.

Stream Reach	Average water depth (ft)		Standard Deviation (ft)	
	1995	1998	1995	1998
Reach 1 (no beaver dam influence)	0.9	0.75	0.36	0.32
Reach 2 (beaver dam influence)	2.15	0.9	0.7	0.42
Reach 3 (beaver dam influence)	1.73	0.8	0.75	0.4

Coping with climate change

We are entering a period of increased climatic variability with more droughts and severe floods. At the same time our demands for water are growing while the quality and quantity is decreasing. Groundwater levels continue to drop, perennial streams go seasonally dry, wet meadows transform into sagebrush- dominated systems in the West, and large floods appear to be increasing.

Too often the response has been to build more reservoirs or build more or higher levees along rivers. These activities may give us greater control over the short-term, but little else. Reservoirs do not provide habitat or wetlands or groundwater storage. Reservoirs often serve only a very few people at the expense of many species and communities. Confined rivers do not recharge water tables or develop complex habitats. Instead, they increase downstream flooding by severing the connection between the river and its floodplain – so there is nowhere to temporary store water.

Competition is increasing between communities and groups for this limited, vital resource. It is time to systematically, strategically, and rapidly restore the stability, complexity and water retention capability of stream and riparian ecosystems. Beavers are key to this restoration. In order for beavers to successfully aid us in restoring watershed vibrancy, stability, and complexity, we must first begin to restore riparian woody vegetation to stream banks – the food and habitat of the beavers – and we must change beaver trapping regulations to provide them greater protection.

The return of beavers and recognition of their contribution, combined with thoughtful assessments of local constraints, will lead to rapid increases in surface and groundwater storage, decreased large floods, improved water quality and increased water quantity within a few years. Beaver restorations will not make sense everywhere because of the extent of human development. There are large areas of public land, however, where beavers could be allowed greater freedom to expand, as well as private lands where beavers would be welcomed. These areas would become water storage zones – complex ecosystem reservoirs that would provide huge benefits to many human and wild communities. Early identification of the suitable areas for beavers, and the acceptable limits of beaver-driven changes, would allow planning to minimize beaver conflicts and maximize benefits.

Time is short. There are many things human and wild communities can live without. Water is not one of them.

Continued on pg. 3...

"Birds, Burns, and Basins" *continued from pg 4...*

The last leg of the tour featured Logan McCrae, field forester with the Oregon Department of Forestry. McCrae brought another perspective to forest management, the perspective of the forester and private land manager. The Cornet-Windy Ridge fire began August 10th, four miles west of Durkee and burned 103,887 acres of private, BLM, and Wallowa-Whitman forestland by October 15th.

"The Cornet-Windy Ridge fire began August 10th, four miles west of Durkee, and burned 103,887 acres of private, BLM, and Forest Service land"

Overlooking a mosaic of burned forestland during the Council's Spring Tour, photo by Anna Morgan (staff)

Because of the severity of this wildfire, some private landowners were devastated and now face reforestation on their properties. McCrae has worked with many of these landowners about salvage-logging and important considerations for a successful project. He discussed the many facets of reforestation including the Oregon State Forest Practices Act, how to obtain seedlings, site preparation, regeneration, planting grass, managing bark beetle and preparing for future fires. McCrae also gave insight to fighting a forest fire, as he had been stationed on the Cornett-Windy and had first-hand experience with wildfire management.

After the conclusion of the speakers, the participants of the tour headed back to their vehicles with a new perspective on forest management, understanding that there are a range of management priorities at work in Oregon's forests. The hike allowed the public to enjoy the forest, even though many of the trees were burned, while also witnessing the life, and wildlife, that blooms after a fire.

The next Council tour will be held in the fall, if you would like more information please contact the Council at 541-523-7288.

Thank you to our hiking guides, Christo Morris, Logan McCrae, and Jamie Ratliff for this informative and fun outdoor experience!

"Meet Our Intern" *continued from pgpage 5...*

Cody Bingham performing water quality monitoring

take on a new intern starting the Fall 2016-17 school year, and will be looking forward to partnering with Baker Technical Institute towards a common goal. The Council also looks forward to seeing Cody work towards his goals in college using the skills he has gained as a valuable outreach intern along the way.

If you would like more information about community outreach projects or to submit a referral for the volunteer outreach internship position please contact the council at (541) 523-7288.

Birds, Burns, and Basins

Life After Forest Fire:
Forest Management Perspectives Spring Tour

By Anna Morgan, *PBWC Staff*

Tour attendees listen as Logan McCrae, ODF, discusses forest management practices after fire

The Powder Basin Watershed Council invited members of the public to join them on a guided hike April 13 to explore the world of post-fire forest management on Dooley Mountain. Gathered that day were private landowners, retired agency persons, interested citizens and outdoor enthusiasts. The trek began at Dooley Summit, an area burned by last summer's forest fires, and led hikers down a dirt Forest Service road.

After a short while, the hikers stopped at an area overlooking a landscape of blackened snags to take a look at a few noisy woodpeckers and chickadees. Here they heard from Jamie Ratliff, Wallowa-Whitman District Forest Service wildlife biologist, about the benefits of fire on the landscape in terms of ecosystem and habitat for wildlife and birds.

Ratliff explained the complexities of managing burned forestland to the group, stating that "fire is an important part of the ecosystem" because it leaves behind burned trees which in turn provide habitat for many species. Ratliff acknowledged the difficulty on landowners when facing wildfires, salvage logging, and reforestation, while also explaining that forests needed to be managed for all the different species of animals as well. In fact, "many species specifically benefit and even depend on severe wildfire to rejuvenate the shrub community and create an abundance of dead trees for foraging and nesting," Ratliff said.

Board Member, Dorothy Mason, shows off her find during the hike

Next stop on the tour featured a discussion led by Christo Morris, Powder Basin Watershed Council executive director. Morris discussed the three types of upland erosion, the factors that affect upland erosion, and how fire alters those factors. The first type of erosion occurs when raindrops hit the surface of the soil directly. This allows soil to be fragmented and wash away or accumulate on the surface and increase runoff, which can eventually lead to the entire surface of the soil washing away. This can be minimized by having a litter layer or mulch on top of the surface soil. In fact, as Morris points out, "a water droplet will reach its max velocity by falling approximately eight feet." This means that if a water droplet fell from a branch roughly nine feet above the soil, the water would have enough force to dislodge soil particles, leading to erosion. The vulnerability of soil depends on many factors including the type of soil, slope steepness, length of slope, and speed of runoff.

The second type of erosion, called sheet erosion, occurs when "water flows evenly across the soil surface, dislodging soil and carrying it downhill." Lastly, Moris discussed gully erosion, "when water concentrates, becomes deeper, and the weight of thw water pushing down increases the erosive force as it flows downhill." For example, a waterfall may form, with runoff picking up energy as it plunges over the gully head.

Continued on pg. 7...

Meet Our Intern

Cody Bingham

2016 Volunteer High School Outreach Intern

The Powder Basin Watershed Council has many stakeholders, members range from individuals in the agricultural community, federal, state, and local agencies, landowners, and community members that enjoy taking an active role in helping improve watershed resources. All of these members dedicate time and hard work as volunteers, going above and beyond their duties as local citizens. Among them, a particular volunteer shines brightly, not only because of the many hours he has contributed to the Council, but also because of his promising future.

Cody Bingham came to the Council in January 2016 as part of a pilot internship program partnership with Baker Technical Institute. Referred by his Aquaponics teacher, Burke Smejkal, Cody was enthusiastic about being able to expand his resume before going to college. Since taking on the role of Volunteer Outreach Coordinator, where he has had the chance to explore the world of natural resources and nonprofits, the Council has watched Cody grow and develop his interest in becoming a natural resource professional. To date, he has contributed over seventy hours of service, working on projects like the Council newsletter, the Spring Tour "Birds, Burns, and Basins", the Spring River Cleanup, and the 2016 Field Day event with Baker City and Haines' 5th grade students.

Cody's journey into natural resources began long before his time with the Council however. Originally from New Mexico, Cody's family moved to Junction City when his father received a liver transplant from OHSU. Here he spent time with his father fishing and camping in the Cascades, nurturing a growing love of the outdoors. After moving around the Willamette Valley for some time, his family finally ended up in Baker City shortly into his freshman year of high school. He quickly acclimated, loving the location and history of Baker, and the huge relief in traffic. "The major difference I noticed about Baker was the friendlier community… I prefer living in rural communities… mostly because of the traffic" Cody explained in a recent interview with the Council. Although he was new, he embraced the changes and culture of Eastern Oregon, and his adaptability is apparent in his work with the Council too.

Eventually, Cody decided to enroll in Smejkal's Aquaponics class where he learned how to run an aquaponics system. Here he sharpened many skills, including how to problem-solve, work in a team, understand the basic biology of an ecosystem, water quality monitoring, and last but not least aquaculture. When asked about his duties in the class, Cody explained:

"We started out by learning the basics of aquaponics, and how to run an aquaponics system. We do daily water quality monitoring, and water exchanges when needed. We started our plants from seed and tracked the fish and plant growth. We had experienced some problem with pests, so we did some research to come up with an Integrated Pest Management Plan (IPMP). Shortly after creating an IPMP we began working in groups of four to build our own system. We worked together to come up with a design, source materials, and put the system together."

The work Cody and his group did in Aquaponics embodies a modern movement of education- combining technical skills with field-based opportunities, producing students who are highly competitive in the workforce even as they exit high school. Being able to take classes like Aquaponics has given Cody a clear path to a career in Natural Resources. Even further, BTI's partnership with PBWC expanded upon the skills he learned in class and allowed him to gain work experience in the process. Cody's hard work was evident in more than just his Aquaponics class however, he was Student of the Month for February of his senior year, and awarded scholarships from EOU, Leo Adler, and The Ford Family Foundation for the 2016-17 years.

Currently, Cody plans to attend EOU in the Fall after High School graduation where he will study to become a Wildlife Biologist. However, like many young students exiting High School, Cody is challenged with the economics of paying for college. He explains, "Being raised in poverty has given me the motivation to make a better life for myself. I am motivated to experience life and to have success and happiness with my life choices."

> ***"I am motivated to experience life and to have success and happiness with my life choices"***

To that end, the Council was happy to have Cody on board during the last leg of his High School journey. The many hours he spent not only added breadth to his resume, but also aided in the conservation of our watershed's resources. Because of volunteers like Cody, the Council is able to complete important water quality monitoring programs, restore riparian areas and rivers, and educate the community about the importance of water resources. The PBWC internship can offer opportunity for students to strengthen resumes and increase technical skills, as well as complete a requirement for the Senior Portfolio required by Baker High School. The Council hopes to ...*Continued on pg. 7...*

Cody Bingham volunteers to reforest severely burned private forestland this Spring with Baker HS

"Beavers" *continued from page 2...*

The author Suzanne Fouty is a hydrologist who speaks about the benefits of beaver restoration as a response to climate change. She is a member of the Powder Basin Watershed Council.

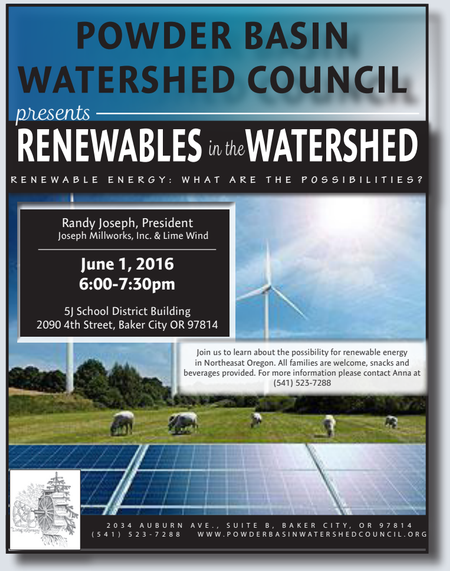
References

Fouty, S.C., (2003). "Current and historic stream channel response to changes in cattle and elk grazing pressure and beaver activity: southwest Montana and east-central Arizona." Ph.D. dissertation. Department of Geography, University of Oregon.

Hey, D. L and Phillipi, N. S. (1995). Flood reduction through wetland restoration: The Upper Mississippi River Basin as a case study. Restoration Ecology, No. 3, pp. 4 –17.

Hood, G. A. and Bayley, S. .E. (2008). Beaver (Castor Canadensis) mitigate the effects of climate on the area of open water in boreal wetlands in western Canada, Biological Conservation.

Naiman, R. J., Johnston C. A. and Kelley, J. C. (1988). "Alteration of North American streams by beaver." BioSciences 38(11): 753-762.



Calendar of Events

June 2016

- **June 1, 2016, Wednesday- Monthly Council Meeting and Guest Speaker**
  5J School District Building, 6:00pm-7:30pm
  Join us for our monthly Council meeting, coffee and snacks provided. Randy Joseph, President of Josph Millworks, Inc. will discuss climate change, renewable energy, and resource potential in Baker County.

- **June 3, 2016, Friday- Baker School Field Day Event**
  (all day event)
  PBWC will host its annual Field Day Event with Baker Elementary and Haines Elementary 5th grade students. This year's Field Day will feature outdoor learning stations including: fish dissection, flow monitoring, watershed modeling, bird habitat, flyfishing, and macroinvertebrate sampling. This is not a public event, if you would like to volunteer please contact the Council.

- **June 24, 2016, Friday- Wallowa Watershed Festival**
  Wallowa County Fairgrounds, Enterprise, Oregon (all day event)
  Alongside Wallowa Valley Music Alliance, we transform the Wallowa County Fairgrounds in Enterprise into an outdoor festival and concert every year. Come celebrate this amazing place with us! Over 25 booths have hands-on activities to learn about our people, land, animals, plants, rocks, and water. This family-friendly event allows individuals of all ages to listen, celebrate, and learn about Wallowa County.

July 2016

****No monthy meeting scheduled for July****

- **July 9, 2016, Saturday- Anthony Lakes Family Fishing Day**
  Anthony Lakes Camp Ground, Baker City, Oregon
  Bring your family up to the freshly stocked lake where people will be available to teach youth how to bait, cast and reel in their catch. Adults can get tips on basic rigging, fish identification and casting. Loaner fishing rods will be available to children that do not have equpiment. There will be an opportunity to learn about macroinvertebrates that inhabit the lake as well. A biggest fish contest will be offered with prizes awarded in several age brackets. Day use fees will be waived for attendees during the event. We hope to see you there! For more information please contact Tim Bailey- ODFW (541) 962-8536.

August 2016

- **August 3, 2016, Wednesday- Monthly Council Meeting**
  5J School District Building, 6:00pm
  Join us for our monthly Council meeting, coffee and snacks provided

All community members are welcome to attend our meetings, for more information please contact the Council at pbwcoutreach@qwestoffice.net or call 541-523-7288

We want to hear from you!

Would you like to be a part of the strategic planning process? How about helping the Council determine how we can better help meet our community needs? You can help us by taking a quick survey online at:

www.powderbasinwatershedcouncil.org