

Watershed Management in the Greater Yellowstone Area: An Interagency Strategy

2020 Update; Action Plan Updated July 2020

Greater Yellowstone Area Hydrology Subcommittee



Beaverhead-Deerlodge National Forest
Bridger-Teton National Forest
Caribou-Targhee National Forest
Custer Gallatin National Forest
Shoshone National Forest
Yellowstone National Park
Grand Teton National Park
National Elk Refuge
Red Rock Lakes National Wildlife Refuge
Bureau of Land Management



Document History

In 2002, GYH presented a document entitled “Watershed Management Strategy for the Greater Yellowstone Area” to provide GYCC with guidance on effective stewardship of watersheds and aquatic ecosystems within the GYA. The strategy was consistent with the President’s Clean Water Action Plan¹, USDA Forest Service Natural Resource Agenda, and USDI Park Service Natural Resource Challenge, as well as with strategic plans developed by both agencies in response to the Government Performance and Results Act². The strategy was designed to be dynamic, adaptive and updated accordingly.

In early 2006, GYH decided to update the original strategy to identify current issues, revise the original strategies, and provides recommended action items. The original strategy remains pertinent as it provides important context and background information for the update. This update builds on the original work by focusing on the issues GYH believe are most important to effective stewardship of watersheds in the GYA. It is intended to help GYCC stay informed on these issues as they advance the conservation of the GYA. The update also provides guidance and further identifies opportunities for coordination among GYH.

The 2011 and 2020 update incorporates more recent references with additional climate change, watershed assessment, and rehabilitation emphasis. Information in the body of the text of previous versions has been moved to an appendix to facilitate development of outcomes, measures, actions, and projects, including project ranking criteria.

Introduction

Water resources and watershed protection are a significant part of the history of the Greater Yellowstone Area (GYA)³. Protection of water and the catchments from which it is derived remains critical to the environmental integrity and economics of the GYA and downstream areas.

The GYA includes the headwaters of the Gallatin, Madison, Yellowstone, Clarks Fork, Wind/Bighorn, Snake and Green Rivers. These headwaters are significant source areas to the much larger Mississippi, Columbia and Colorado River basins. As the twenty-one counties of the GYA distinguish themselves as some of the faster growing areas in the United States, water resources of the GYA will realize unprecedented importance and pressure to satisfy human needs. Furthermore, with changing climate becoming a greater ecological concern in the region, the implications for water resources in the GYA will gain more prominence. Thus, water may very well be the most valuable natural resource in the Greater Yellowstone Area.

Watershed resources have been a management priority on public lands in the GYA for many years. In 1990, an ad hoc group of professional hydrologists formed a subcommittee⁴ to coordinate watershed management across GYA federal units and serve as technical advisors to the Greater Yellowstone Coordinating Committee (GYCC)⁵.

¹ President’s Clean Water Action Plan of 1999 - <http://www.epa.gov/history/topics/cwa/03.htm>

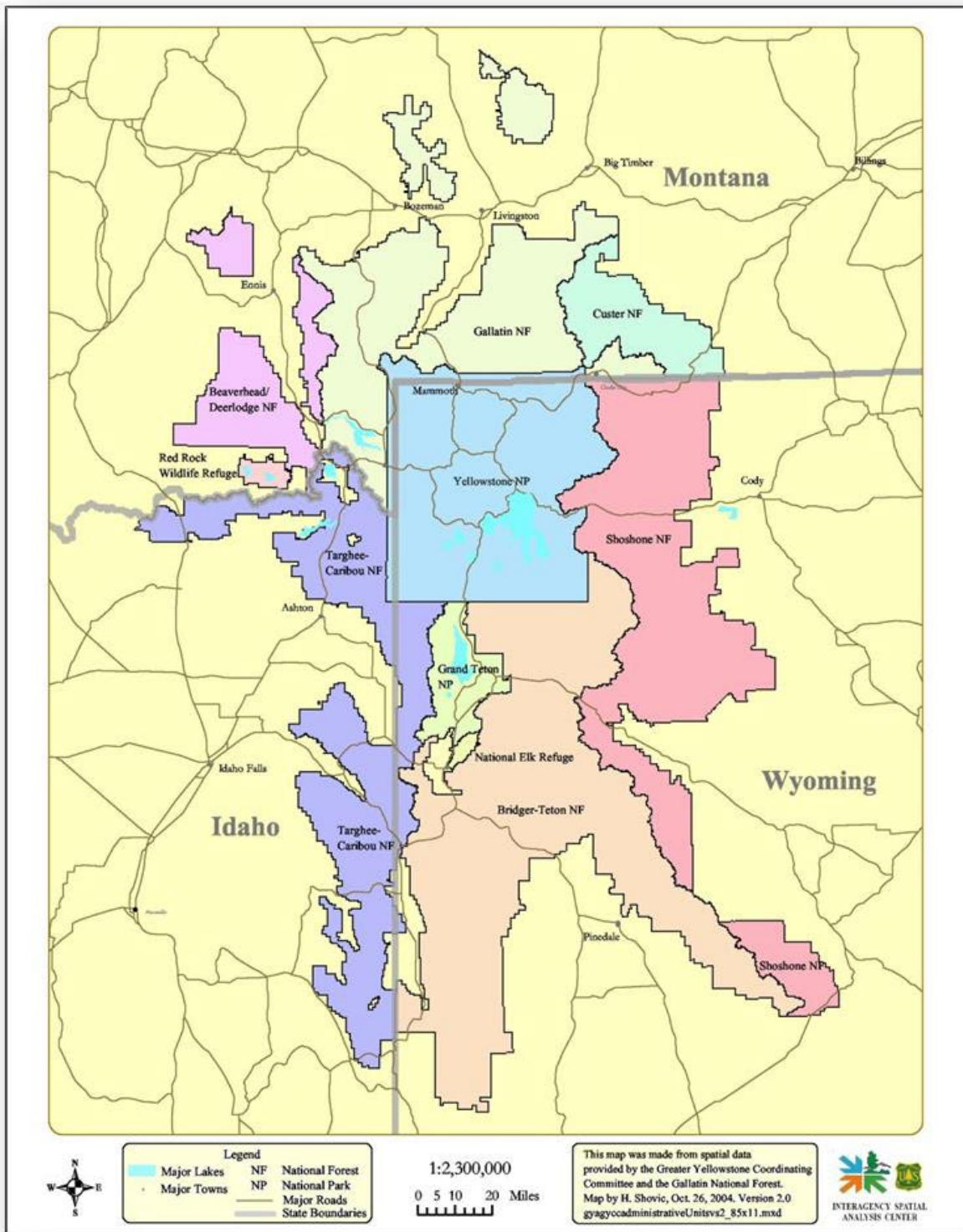
² Government Performance and Results Act of 1993- <http://govinfo.library.unt.edu/npr/library/misc/s20.html>

³ The Greater Yellowstone Area is shown in Figure 1. It encompasses Yellowstone and Grand Teton National Parks; six National Forests: Caribou-Targhee, Beaverhead-Deerlodge, Gallatin, Custer, Shoshone, and Bridger-Teton; two National Wildlife Refuges: National Elk Refuge and Red Rock Lakes Refuge; Bureau of Land Management lands; Tribal lands, State Land, and private property. All lands which are important components of the GYA.

⁴ Titled Greater Yellowstone Hydrologists (GYH), the subcommittee consists of hydrologists from the USDI Park Service and USDA Forest Service.

⁵ The Greater Yellowstone Coordinating Committee consists of Park Superintendents, Forest Supervisors, and Refuge Managers from the units identified in footnote 3.

Figure 1: Greater Yellowstone Area and Major Federal Administration Units



Issues

Healthy watersheds operate in dynamic equilibrium, meaning soil and water quality, flow regimes, and aquatic and riparian habitats vary within a certain range of conditions. Extreme natural disturbance events, e.g., catastrophic wildfire or floods, can disrupt the dynamic equilibrium of a watershed, but then recovery begins. Poor land management decisions and activities, e.g., excessive road construction, water diversions, timber harvest, mining or overgrazing, can also disrupt this dynamic equilibrium.

Laws and regulations direct federal land managers to maintain equilibrium conditions and to restore watershed function within degraded drainages. A key role of GYA agencies is managing disturbances while sustaining watershed health. If runoff and sediment regimes, soil and channel conditions, water quality, and aquatic and riparian habitats are maintained between extreme natural events, and good land management decisions are made, watershed health is conserved.

Increasing demands on the natural resources of the GYA have the potential to negatively affect equilibrium conditions, which would not only impact water resources locally within the GYA but for many miles downstream. To ensure these conditions do not develop and efforts to improve existing conditions can occur, interagency cooperation at the watershed scale is paramount to protect water supplies and water rights, water quality, and watershed, riparian area, and geomorphic integrity. To that end, GYH believes the following issues are the most important in the GYA at the present time.

1. Interagency cooperation on a watershed scale
2. Watershed, riparian area, and geomorphic integrity
3. Water quality protection and enhancement
4. Water flow, water supply, and water rights

Issue 1 - Interagency cooperation on a watershed scale

Riverine ecosystems and their watersheds are multidimensional, including a longitudinal (upstream to downstream) element, a lateral (floodplains to uplands) component, a vertical (subsurface to riparian) aspect, and a temporal feature (Williams et al 1997). In recognition of the multi-dimensional nature of watersheds and that federal land management decisions can affect local or regional economies, federal land management entities published a *Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management* (UFP) in 2000⁶. This inter-agency policy provides a foundation to help ensure that Federal land and resource management activities meet the goals of the Clean Water Act and that the Federal government serves as a model for water quality stewardship. GYH and GYCC recognize the value of cross-boundary cooperation and collaboration and believe UFP is a good model to follow. To that end, it is important that Park Service, Forest Service, Fish and Wildlife Service, Bureau of Land Management, state agencies, conservation districts, watershed groups, and private land owners be involved in watershed management in the GYA. The importance of broad cooperation in watershed planning became further heightened with the passage of the Craig Thomas Snake Headwaters Legacy Act of 2008. This Act added almost 400 miles of streams in the headwaters of the Snake River in Wyoming to the National Wild and Scenic Rivers System. These rivers are to be administered with the goal of protecting and enhancing the Outstandingly Remarkable

⁶ <http://www.epa.gov/EPA-IMPACT/2000/October/Day-18/i26566.htm>

Values that enabled them to be designated, with public participation and interagency cooperation in every step of the process.

Issue 2 - Watershed, riparian area, and geomorphic integrity

The goal of watershed conservation is to sustain and restore watershed, riparian area, and geomorphic integrity. Land and stream types, and their dynamic equilibrium ranges, vary within and among landscapes due to variations in climate and geology. This variation must be taken into account as pressures on water resources and watersheds in the GYA increase. Dynamic equilibrium ranges can be defined by sampling reference land and stream types across the landscape and by comparing non-reference conditions with their representative reference counterparts.

Land management activities and uses have the potential to significantly affect sediment loading and transport, particularly because they are directly influenced by stream discharge. Riparian vegetation is a key component in overall stream/aquatic health and function. While there have been numerous efforts to characterize riparian communities and condition within the GYA, little work has been conducted to integrate this information with stream systems. To fully protect riparian area values such integration is critical.

To begin developing answers to some of these needs, the original strategy recommended development of stream health reference conditions for the GYA. GYCC pursued this recommendation by funding a team to field-inventory reference aquatic conditions on a variety of functioning landscapes and then develop relationships to describe reference conditions for physical and biological components of the aquatic system. A database has been developed and peer-reviewed publications that summarize the data have been presented at scientific conferences. Past efforts provide a great start to understanding GYA stream systems; additional work will further those benefits.

The key to preparing hydrologic and riparian systems for climate change is to make them healthy and resilient now. Different sections of rivers would have different sensitivities to changed conditions (Bakke, 2009), and those stream types that are most sensitive, and have the lowest recovery potential, would be most susceptible to changes due to those imposed by changes in climate. Wetlands and floodplains that can store water provide prolonged water supplies to streams and riparian areas during summer. Functional riparian areas stabilize stream channels that are dependent on vegetation for bank stability, moderate changes in stream temperatures, filter sediment, and take up nutrients that would otherwise be delivered directly to streams. Resilient watersheds recover better and more quickly from large disturbances.

Maintaining the condition of streams and their associated riparian areas is the best way to address potential impacts of climate change and to ensure that these systems have the resilience to respond to new magnitudes and frequencies of disturbance imposed on them.

Issue 3 - Water quality protection and enhancement

The protection and enhancement of water quality is fundamental to providing effective stewardship of watersheds and aquatic systems. Compliance with water quality standards, along with close cooperation with the EPA, state agencies, and other interested parties, is of increasing

importance as states perform water quality assessments, e.g., 305(b)/303(d) reports, sub-basin assessments and watershed assessments, and identify total maximum daily loads for impaired water bodies. Water quality effects of National Environmental Policy Act decisions are increasingly scrutinized by special interest groups, particularly related to fuels treatment, timber harvest, road construction, livestock grazing, and mineral development projects.

Water quality protection and enhancement is a fundamental stewardship responsibility of GYCC and is central to all land management activities. The original GYA water strategy recognized that transportation systems and livestock grazing are major concerns within watersheds identified as having low or moderate geomorphic and water quality integrity. Within the GYA, available road maintenance funds are considerably less than annual maintenance needs, making efforts to reduce maintenance backlogs difficult. Legacy Roads and Trails and ARRA funding has helped reduce the backlog in recent years on National Forest lands. Legacy and HTAP funds have been also been useful in road decommissioning and aquatic passage projects since 2008. Considerable efforts are being made to update allotment management plans, but some grazing allotments are currently managed with outdated plans, are overstocked and/or have poor livestock distribution, and generally lack adequate administration and monitoring. Interdisciplinary participation is very important as managers address water quality issues in the GYA. Impacts of fire – both wildfire and prescribed burning—on water quality (and soils) are still being researched, though significant progress has been made in evaluating the effectiveness of mitigation measures. In some parts of the GYA, too, as oil and gas development expand, water quality protection becomes a more complicated issue with the protection of groundwater becoming more prominent. Exploration and development of natural gas fields in western Wyoming are proposed near domestic water supplies and in aquifers (and surface water systems) that are tributary to important fisheries and upstream from newly designated Wild and Scenic Rivers. Questions about the impacts of hydraulic fracturing continue to be debated on the national level and are relevant in this area. Other minerals activities (gravel, etc.) also have the potential to adversely affect water resources.

Changes in water quality within GYA hydrologic systems due to climate change are predicted by many members of the scientific community over the next several decades. Some changes are already apparent. (Karl et al., 2009; Harris et al., 2006; Furniss et al., 2010).

- Higher water temperatures, especially during summer low-flow periods resulting in lower dissolved oxygen levels.
- Higher magnitude storm events leading to increased sediment production from uplands and increased channel scour, and higher sediment levels in runoff. Negative impacts of sediment (and associated pollutants) will be amplified by longer periods of low streamflows that have reduced capacity to transport sediments downstream.
- Increased nutrient inputs to streams as wildfire frequencies increase. Higher water temperatures would increase stream productivity, further decreasing dissolved oxygen levels.

Issue 4 - Water flow, water supply, and water rights

Population increase, drought, and climate change all point toward the potential for increased demand on a finite supply of freshwater in the west. The 2010 Census identified the four fastest growing states in the nation as Nevada (#1), Arizona (#2), Utah (#3), and Idaho (#4); these states

had between 21% and 35% population growth over the decade. Montana, Colorado, Wyoming, Oregon and Washington, all states within or downstream of the GYA headwaters, saw population growth between 9% and nearly 17% for the decade.

<http://2010.census.gov/2010census/data/apportionment-pop-text.php>)

Nationwide, total water use has dropped and leveled off from a peak in the 1980s, but Idaho, Wyoming and Montana continue to lead the nation for per capita total water use (surface and groundwater, including irrigation). Data for the period 1971-2000 suggest that much of the area in and around GYA is in a declining snowpack and precipitation trend (5 to 20%) in Mote and others, (2005). Although stream flow withdrawal and reservoir storage capacity in western states appears to be static or increasing, groundwater levels in aquifers in and around major western population centers have consistently and steadily dropped over the last 40-50 years.

Climate change is expected to continue, and likely accelerate, for the foreseeable future. The American West is likely to warm more than the worldwide average (3-10°F) with regional climate models suggesting temperature increases could be 4-13°F by the end of the century (Western States Water Council 2006). Hydrologic and climatic processes that could accompany this warming include: less snow pack, earlier snowmelt, more frequent flood events, receding glaciers, higher evapo-transpiration rates, more frequent/intense/longer droughts, more frequent/intense wildfires, and reduced summer/fall stream flows and groundwater levels (McWerthy and others, 2010).

The State of Montana has authority to control or close river basins and groundwater aquifers to certain types of new water appropriations because of water availability or contamination problems, or a concern for protecting existing water rights. The Rock Creek drainage on the Beartooth District, Custer National Forest has an existing basin closure related to water availability problems and protection of existing water rights. The State of Montana will not accept any applications for new appropriations of consumptive use between June 1 and September 30 within this basin. Other closures exist around Yellowstone National Park, which area related to maintaining natural resources for the Park and Red Rock Lakes National Wildlife Refuge, or do not restrict new appropriations for consumptive use. The Island Park and Corwin Springs Known Geothermal Resource Areas (KGRA's) protect geothermal areas near the Park from ground water withdrawal.

The State of Idaho issued a number of moratoriums on new water appropriations for various basins in southern and central Idaho, and in particular the Snake River basin. Although this moratorium has expired, new applications are still not being approved for most of the eastern Snake River basin (Laprevote, 2006).

Pressures to augment water supplies within GYA have resulted in efforts to persuade land managers to increase water yield through activities such as harvesting timber, building more water storage on public lands, cloud seeding, or permitting more diversions. For example the Big Hole Watershed Committee hired a consulting firm to investigate the impacts of upland vegetation change on water availability and identify water management alternatives to increase instream flows. Wyoming passed legislation to use its powers to enter national forests to harvest timber for water yield increase. A proposed dam on the Upper Green River in Wyoming would divert up to 250,000 acre-feet of water per year to satisfy agricultural, municipal, and industrial needs in southeastern Wyoming and the Front Range of Colorado, 500 miles away. Although it is unclear how demands for water in and adjacent to GYA will influence future water quantity or uses, it is likely that withdrawals from river systems and aquifers by larger population centers below GYA will continue to increase. Because there is a lack of incentives for water

conservation on lands downstream of GYA, there will be continued pressure on GYCC to increase water quantities from public lands, which may be contrary to management goals for resource protection. In 2002, concerns over on-going drought and water supplies prompted Regional Foresters in Regions 2 and 4 to provide written direction to Forest Supervisors (USDA Forest Service 2002, 2002a) concerning water yield augmentation. Both letters are similar, but the Region 4 letter includes an enclosure titled *National Forest Water Yield Augmentation-Limited Opportunities Due to Operational Realities*. That document provides a good summary of the science, opportunities, limitations and consequences of water yield augmentation on forested lands.

Concerning state water law, recent court cases have diminished or threaten to further diminish, the ability of federal land management agencies to manage and protect water uses on federal lands. Several recent state court decisions have allowed non-agency users to secure water rights – such as permittees. Given these judicial opinions and potentially similar future case rulings, it is imperative that GYA agency water rights are current and correct and all appropriate uses are claimed through the state’s water rights adjudication processes.

Ongoing water rights activities by each of the GYA units include engagement with water rights adjudication processes in Idaho, Montana and Wyoming including filings and objections to proposed uses that could harm NF, NPS, or FWS water needs. Water rights clauses are commonly used in special use permits to protect GYA beneficial uses and instream flows. In addition water rights, water uses, and water transmission facilities are, as appropriate, incorporated into land management decisions.

Montana, Wyoming, and Idaho have different instream flow quantification and permitting procedures which are used by GYA units to secure instream flows. For example, Montana Forests are actively working with the Montana DNRC and DFWP to secure fisheries instream flows water rights through the wetted perimeter quantification procedure.

A useful inventory would be a listing of potential dam site withdrawals in the GYA for each of Idaho, Montana, and Wyoming as dam site development could have substantial changes in water regimes downstream. Dams on federal lands lead to a large burden on federal agencies regarding maintenance, water rights, safety of downstream communities, and other obligations that should be investigated thoroughly before an agency accepts the obligation of a new dam as witnessed by the Bridger-Teton National Forest’s experience with their remaining dams. The Bureau of Reclamation and the State of Idaho recently initiated the Henry’s Fork Basin Special study to develop alternatives to improve water supply conditions in the Eastern Snake Plain aquifer and Upper Snake River basin. The study will identify opportunities for development of water supplies (i.e., above-ground storage, aquifer storage) and improvement of water management (i.e., conservation measures, optimization of resources), some of which may affect federal lands in the GYA.

Summary

Healthy watersheds in the Greater Yellowstone Area are critical to environmental integrity and area economics. The GYCC recognizes the importance of watershed health and has developed a strategy for management of water resources within its purview. The strategy focuses on four key issues relevant to land management at the present time – interagency cooperation on a watershed scale; watershed, riparian area, and geomorphic integrity; water quality protection and

enhancement; and water flow, water supply, and water rights. Within the strategy and these four issues, GYCC and one of its sub-committees, the Greater Yellowstone Hydrologists, have identified numerous actions items to be pursued over time. Implementation of the action items will allow for effective stewardship of watersheds and aquatic ecosystems by creating a forum for communicating and addressing watershed management information and issues, and coordinating watershed management activities between states and federal agencies in the GYA.

References

Bakke, P. 2009. Physical science and climate change: a guide for biologists (and others). Stream Notes, Rocky Mountain Research Station. April 2009.

BLM website on water laws: <http://www.blm.gov/nstc/WaterLaws/> This website reviews the water laws of eleven western states (Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming). Special attention is paid to the states' water rights systems, the application processes, groundwater regulations, the general adjudication processes, and the states' instream flow programs. Where information is available, comment is made on how the states handle federal reserved water rights and on other BLM specific information.

Anderson, Mark T. and Woosley, Lloyd, H., Jr. 2005. Water availability for the Western United States- Key scientific challenges: U.S. Geological Survey Circular 1261, 85 p. Available on-line: <http://pubs.usgs.gov/circ/2005/circ1261/>

Bartos, Dale L. Landscape Dynamics of Aspen and Conifer Forests, pages 5-15; in Sustaining Aspen in Western Landscapes: Symposium Proceedings, June 13-15, Grand Junction, Colorado. USDA Forest Service, Rocky Mountain Research Station RMRS-P-18, May 2001.

Upland Properly Functioning Condition Process – 1996 - Intermountain Region, US Forest Service, Ogden UT.

Caribou National Forest and Surrounding Area Sub-Regional Assessment (Upland) Proper Functioning Condition (PFC) - May 6, 1997 version. Caribou National Forest, Pocatello, ID.

DTM Consulting, Inc., Mainstream Restoration Inc., and Portage Environmental Inc. 2005. Big Hole water storage scoping project and water management review, final report, water management alternatives. Prepared for: Big Hole Watershed Committee, Butte MT. 85 pgs. Available on-line at: <http://www.bhwc.org/>

DTM Consulting, Inc. 2006. Vegetation change and impacts to the annual water budget, Big Hole River, Montana. Prepared for: Big Hole Watershed Committee, Butte MT. 62 pgs. Available on-line at: <http://www.bhwc.org/> FS Manual Directives, FSM 2541 - National Forest System Water Rights.

Furniss, M.J., B.P. Staab, S. Hazelhurst, C.F. Clifton, K.B. Roby, B.L. Ilhardt, E.B. Larry, A.H. Todd, L.M. Reid, S.J. Hines, K.A. Bennett, C.H. Luce, and P.J. Edwards. 2010. Water, climate change, and forests: watershed stewardship for a changing climate. Gen. Tech. Rep. PNW-GTR-812. Portland, OR: USDA, Forest Service, Pacific Northwest Research Station. 75p.

Harris, J.A., R.J. Hobbs, E. Higgs, and J. Aronson. 2006. Ecological restoration and global climate change. Restoration Ecology, 14(2):170-176.

Idaho Department of Water Resources – Water Rights/Moratoriums:
<http://www.idwr.idaho.gov/WaterManagement/default.htm>

Karl, T.R., J.M. Melillo, and T.C. Peterson, eds. Global climate change impacts in the United States. 2009. Cambridge University Press. Available at <http://www.globalchange.gov/usimpacts>.

McWethy, David B., D.B., S.T. Gray, P.E. Higuera, J.S. Littell, G.T. Pederson, C. Whitlock. 2010. Climate and Terrestrial Ecosystem Change in the U.S. Rocky Mountains and Upper Columbia Basin -- Historical and Future Perspectives for Natural Resource Management. Natural Resource Report NPS/GRYN/NRR—2010/260

Montana Department of Natural Resources and Conservation, Water Resources Division, Water Rights Bureau: http://dnrc.mt.gov/wrd/water_rts/default.asp

Mote, P.W., A. F. Hamlet, M. P. Clark, D. P. Lettenmaier. 2005. Declining Mountain Snowpack in Western North America. Amer. Met. Soc. 2005

<http://www.livingrivers.org/pdfs/LRlibrary/ClimateDocs/MoteHamletClarkLettenmaier.pdf>

Basin closures: http://dnrc.mt.gov/wrd/water_rts/default.asp#nai

USDA Forest Service. 2002. Rocky Mountain Region Regional Forester letter to Forest Supervisors concerning Water Yield Enhancement dated July 12, 2002. Lakewood, CO. 2 pgs.

USDA Forest Service. 2002. Intermountain Region Regional Forester letter to Forest Supervisors concerning Drought Conditions and Conservation Measures dated March 14, 2002. Ogden, UT. 2 pages with 10 page enclosure.

Western States Water Council. 2006. Draft report on sustainable development and use of water within the context of growing and competing demands. Submitted to Western Governors' Association. Midvale, UT. 21 pgs.

Wyoming State Engineers Office: <http://seo.state.wy.us/>

Federal Register. 2000. Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management. Volume 65, No. 202, Part VII. October 18.

Williams, J.E., C.A. Wood, and M.P. Dombeck, editors. 1997. Watershed restoration: principles and practices. American Fisheries Society, Bethesda, Maryland.

Wohl, Ellen E. 2000. Mountain Rivers. American Geophysical Union.

Meiman, James and Larry J. Schmidt. 1994. A Research Strategy for Studying Stream Processes and the Effects of Altered Streamflow Regimes. Rocky Mountain Forest and Range Experiment Station.

USDA Forest Service. 2000. Watershed Management Strategy for the Greater Yellowstone Area.

USDA Forest Service. Inland West Watershed Initiative. Unpublished

Appendix A: Recommended Actions (Updated July, 2016)

To address the issues discussed above the GYH recommends the following actions. Some items will need to be implemented sequentially, while others can be implemented concurrently. Many of the items are an integral part of ongoing programs. Several of the projects use the Watershed Condition Classification (WCC) on National Forest land expanded to include YNP, GTNP, NER and RRL. <http://fsweb.wo.fs.fed.us/wfw/watershed/watershed-classification.html>. BLM in Wyoming, Montana, and Idaho have completed other forms of watershed analysis whereby watershed restoration priorities have already been established. Those BLM identified priority watersheds have been included into the appropriate action below.

Issue 1 - Interagency cooperation on a watershed scale

Outcomes

- Establish larger scale efforts across ownership/administrative boundaries to expand educational awareness, tackle complex watershed issues in planning and implementation phases, and expand collaborative restoration efforts to maximize funding leveraging capabilities.

Measures

- Number of partners involved in specific project or planning effort.
- Amount of partnership funds acquired against other funding sources.
- Amount of information shared across boundaries.

Action

- Use GYH as a forum to share technology, expertise, and information across agency boundaries.

Projects- Specific Project to address Action Items

1. Create a list of widely used references for hydrologic evaluations, share inventory and monitoring data across administrative boundaries, and create a list of subject matter experts (hydrology, soils, aquatics) in the GYA.
2. Sponsor a headwaters conference with a watershed science theme that focuses on the importance of watershed health in the GYA. Such a conference could further advance the conservation of water resources in the GYA by bringing together leading scientists working in the field of wildland watershed management.

Action

- Identify potential partners and funding sources.

Project

1. Invite BLM, EPA and state DEQs to join GYH and engage, as necessary, local conservation districts and local watershed groups and NGO's.

Action

- Identify cooperative watershed planning, monitoring and restoration opportunities.

Project

1. Specifically, identify shared 4th-6th HUC level watershed hydrologic unit boundaries and develop out year projects for potential funding.

Action

- Identify priority watersheds and development of watershed action plans to improve watershed condition and begin to implement action plan projects

Projects

1. Identification of priority watersheds within the GYA National Forest lands from the Watershed Condition Classification (WCC).
2. Identification of priority watershed for YNP, GTNP, NER and RRL for high priority watersheds. Consider including BLM lands as BLM is now officially part of the GYCC.
3. Identify the highest priority watersheds for the GYA.
4. Develop Watershed Action Plan(s) for selected high priority watershed(s) within the GYA.
5. Cooperatively work with lead management agencies to implement identified projects withing the Watershed Action Plan(s).

Issue 2 - Watershed, riparian area, and geomorphic integrity

Outcomes

- Streams in the GYA are managed for water quality protection or enhancement and riparian and geomorphic integrity.

Measures

- Completion of Watershed Condition Classification on National Forest lands and expanded to NPS lands which includes attributes for riparian/wetland vegetation condition and soil erosion/contamination.
- Watershed action project plans for entire GYA for high priority watersheds. Identification of priority watersheds and development of watershed action plans to improve watershed condition.

Action

- Develop watershed action project plans for entire GYA for high priority watersheds. Identify highest priority watersheds in GYA and begin to implement action plan projects

Projects

1. Watershed Condition Classification (WCC) to be completed all National Forests at the HUC6 level. Ongoing with unit base funds on National Forests. (Completed in FY2011)

2. Watershed Condition Classification (WCC) completed for Yellowstone, Grand Teton NP's, and NER and RRL for at least the aquatic physical and aquatic biological attributes. (Completed in FY2012). With the BLM now officially part of the GYCC consider extending the WCC onto BLM lands within the GYA.
3. Develop WCC maps for the GYA based on attribute ratings for water quality and riparian/wetland vegetation for GYA NF's and NP's and NWR's. (Completed in FY2012). Update GYA maps if BLM classifies watersheds using the WCC.
4. Identification of priority watersheds within the GYA National Forest lands from the Watershed Condition Classification (WCC).
5. Identification of priority watershed for YNP, GTNP, NER and RRL for high priority watersheds.
6. Identify the highest priority watersheds for the GYA.
7. Develop Watershed Action Plan(s) for selected high priority watershed(s) within the GYA.
8. Cooperatively work with lead management agencies to implement identified projects withing the Watershed Action Plan(s)

Actions

- Better define the relationship between physical stream health and riparian vegetation health in the GYA. Pursue building such a relationship by correlating stream type with plant community type.
- Better define stream discharge/sediment transport relationships in the GYA.

Projects

1. Coordinate sediment/discharge databases; identify additional streams, timeframes, protocols, and funding sources for improved GYA information.
2. Develop sediment rating curves for bedload and suspended sediment discharge.
3. Continue to refine the relationship between short-term stream channel alteration and long-term channel stability, by channel type, throughout the GYA. This will help develop allowable annual channel alteration guidelines for use in grazing allotment management and other types of management.

Issue 3 - Water quality protection and enhancement

Outcomes

- Maintain or improve water quality conditions. Streams and riparian areas in the GYA are managed for water quality protection and riparian and geomorphic integrity.

Measures

- Completion of Watershed Condition Classification on National Forest land which includes attributes for water quality condition, aquatic habitat, and aquatic biota.

Action

- Identify, prioritize, and implement water quality protection and enhancement needs within the GYA. Each unit should prioritize its watershed improvement needs by sixth-level watershed hydrologic unit, with identification of the necessary projects required to move those watersheds toward good watershed condition class. This assessment will be done for all National Forests in 2011 via the Watershed Condition Framework using the Watershed Condition Indicator format and procedures. Projects include expansion of the WCC assessment, priority watershed identification, and development of watershed action plans to the GYA National Parks and National Wildlife Refuges.

Projects

1. **Reference Multiple Indicator Monitoring Stream Surveys** - Perform a widespread field-inventory of grazed and ungrazed stream systems examining annual use and long term condition indicators. Construct a database to increase the understanding between annual grazing indicators and long term trend/condition indicators. Use data to improve the understanding of recovery rates on grazed systems, refine the use of annual grazing indicators to achieve desired conditions, and to identify reasonable objectives for attaining desired future conditions on grazing allotments.
2. Watershed Condition Classification (WCC) to be completed all National Forests at the HUC6 level. Ongoing with unit base funds on National Forests.
3. **Watershed Condition Classification (WCC)** completed for Yellowstone and Grand Teton NP's and NER and RRL for at least the aquatic physical and aquatic biological attributes.
4. **Develop WCC maps** for the GYA based on attribute ratings for water quality, and riparian/wetland vegetation for GYA NF's, NP's and NWR's.
5. Identification of priority watersheds within the GYA National Forest lands from the Watershed Condition Classification (WCC).
6. Identification of priority watershed for YNP, GTNP, NER and RRL for high priority watersheds. Consider including BLM lands
7. Identify the highest priority watersheds for the GYA.
8. Develop Watershed Action Plan(s) for selected high priority watershed within the GYA.
9. Cooperatively work with lead management agencies to implement identified projects withing the Watershed Action Plan(s)

Actions

- Closely collaborate with the Departments of Environmental Quality in Montana, Idaho, and Wyoming in preparation of watershed and TMDL plans. Each unit should ensure that plans identify and provide management direction to resolve water quality issues and take an active role in the development and implementation of projects identified in the subsequent TMDL Implementation Plans.
- Monitor water quality impacts of management activities through best management practices (BMPs) implementation and effectiveness monitoring for specific projects

(timber activities, grazing allotments, mining, and other projects important to GYA units) consistent with MOU's with the DEQ's in Wyoming, Montana, and Idaho.

- Actively collaborate with range management programs to refine the use of annual livestock grazing indicators, i.e., stream bank alteration, forage utilization, woody browse, and stubble height, in order to achieve desired conditions. Continue to share information regarding the development and use of annual livestock grazing indicators to achieve long term objectives among GYA units.
- Using interdisciplinary teams, develop standards, long-term indicators, desired future condition statements for us, and objectives in allotment management plans (AMPs).
- Collaborate with engineering programs to disconnect roads and trails (motorized and non-motorized) from streams where road drainage is allowing sediment and runoff to enter streams. Decommission or obliterate excess (unnecessary) roads.
- Design adequate relocations for roads and trails that encroach on streams or cause either sediment or channel configuration problems.
- Integrate fisheries/aquatics, watershed, and engineering specialists to identify and resolve barriers to aquatic organism passage. Design new or replacement crossing structures to pass flood flows and to maintain channel function through the structure.
- Work with Fire personnel for mutual resource protection and enhancement goals in prescribed burns and wildfires, in all phases of operations.
- Work to prevent adverse impacts to ground- and surface water resources from oil and gas development, and other mineral development activities.

Issue 4 – Water flow, water supply, and water rights

Outcomes

- Landscapes that are managed to ensure healthy water flow and reduction of water consumption.

Measures

- Number of diversions reconstructed to supply the correct amount of water as indicated on the water right. Intent of this measure is to maximize and protect the instream flows.
- Quantity of water restored to instream flow.
- Number of water rights updated and corrected.
- Inventorying water rights and how they can continue to be held in public trust.
- Number of Dam sites inventoried and/or withdrawn.

Actions

- Ensure agencies are engaged with state water right adjudication processes at all agency levels. Use state water right laws and procedures including filings, objections and abandonment in order to defend legitimate beneficial use rights in headwater areas.
- Ensure agency water rights are current and correct. Use appropriate procedures to file for or correct water rights where necessary.

Projects

1. Ongoing on GYA Forests (state adjudication processes, filing for water rights, water rights clauses in SUP's, land use planning).

Actions

- Coordinate with the Wyoming State Engineers Office, Montana DNRC, and Idaho Department of Water Resources to ensure that water uses on National Forests are filed appropriately and in the name of the United States.
- Quantify and secure instream flows through State of Montana, Idaho, or Wyoming processes as opportunities occur.
- Participate on regional and basin water storage planning efforts to ensure watershed resources are protected and enhanced.

Projects

1. Ongoing on GYA Forests – instream flow quantification through state processes Montana Wetted Perimeter process ongoing for instream flow rights.

Actions

- Incorporate appropriate water right clauses in special use permits to protect USFS, NPS, BLM, and USFWS interests and instream beneficial uses.
- Ensure water rights, water uses and water transmission facilities are incorporated into land management planning decisions.

Projects

1. Provide a peer reviewed document summarizing research findings and pros/cons to GYCC for consistency in discussions with public/local governments.
2. Coordinate with the Forest Service Stream Systems Technology Center for development of the peer reviewed document.

Actions

- Prepare a communication/presentation for agency line officers on the importance of ensuring proper water right filings for agency use and special use permits and challenging water rights applications that directly conflict with agency goals and missions. Consider a version of the BLM water rights workshop presented in Billings, MT, June 2004.
- Compile existing data related to climate change stressors on a watershed scale.

Projects

1. **Dam site Inventory**- Document inventoried potential dam site withdraws in HUC5's of the GYA of in Wyoming, Montana, and Idaho.
2. **GYA SNOTEL Precipitation Record Basic and Trend Statistical Analysis** - (note: this may already be completed in recent climate change research/literature which could then be localized to the GYA).

Action Plan – Project Summary

| Priority | Project Title | Year | Issue Addressing | Responsible Party | Specific Outcomes | Costs | Partners |
|----------|--|------|------------------|---|--|------------------|--|
| | Dam Site Inventory COMPLETED-2012; Refined and Presented to GYCC-2013; Document finalized-2013 | 2012 | Issue 4 | Shoshone, Gallatin, and Targhee NF's | Inventory potential dam site withdraws in HUC5's of the GYA in Wyoming, Montana, and Idaho | \$3,000 FY 12 | Montana, Wyoming, Idaho state agencies |
| | WCC for YNP, GTNP, NER and RRL COMPLETED-2012 | 2012 | Issues 2, 3, 4 | Gallatin, Shoshone, Bridger Teton, and Targhee NF's | WCC ratings by HUC6 for at least the aquatic physical and aquatic biotic attributes | \$7,000 | NPS staff in YNP and GTNP USFWS staff at NER, RRL |
| | WCC maps for GYA COMPLETED-2012 | 2012 | Issues 2, 3, 4 | | WCC GYA maps of aquatic physical and aquatic biotic attributes | \$5,000 | |
| | Reference Multiple Indicator Monitoring Stream Surveys COMPLETED-2014 | 2013 | Issue 2 | Caribou and Targhee NF's lead | annual livestock grazing indicators for GYA units | \$12,000 | Each unit to provide 3 possible reference sites by June. Develop contract or work with BLM to conduct. |
| | Summarize Reference Multiple Indicator Monitoring Stream Surveys that were completed 2014 – INPROGRESS TO BE COMPLETED IN 2016 | 2015 | Issue 2 | Caribou and Targhee NF's lead | Annual livestock grazing indicators for GYA units | \$2,000 | Summarize all data. Try to include other surveyed MIM data |

| | | | | | | | |
|---|---|------|-----------------|--------------------------------------|---|----------|--|
| | Identify Priority Watersheds for targeted improvement – COMPLETED 2015 (see GYA Priority Watershed Restoration Strategy, June 8, 2015) | 2015 | Issues 2 & 3 | YNP and GTNP, NER, RRL, USFS and BLM | Identify priority watersheds for watershed improvement | \$2,000 | All GYA Units & staff |
| | Prioritize, Develop and Implement Watershed action plans for priority watersheds in the GYA - COMPLETED 2015 (see GYA Priority Watershed Restoration Strategy, June 8, 2015) | 2015 | Issues 1, 2 & 3 | All GYA units | Develop Watershed action project plans for YNP, GTNP, NER, RRL for high priority watersheds | \$11,000 | All GYA Units & staff |
| 1 | Implementation of Watershed Restoration Action Plans (WRAP) previous completed and complete new WRAP as identified in the GYA Priority Watershed Restoration Strategy, June 8, 2015; updated July 12, 2016 (Details Below) | 2016 | Issues 1, 2 & 3 | All GYA Units | Complete WRAPs to identify essential watershed improvement projects. Assist in the implementation of essential project in priority watersheds | \$13,000 | USFS GYA staff |
| 2 | Summarize Reference Multiple Indicator Monitoring Stream Surveys that were | 2016 | Issue 2 | Caribou and Targhee NF's lead | Annual livestock grazing indicators for GYA units | \$2,000 | Summarize all data. Try to include other surveyed MIM data |

| | | | | | | | |
|---|---|-------------|-----------------|---------------|--|---|-----------------------|
| | completed 2014 – INPROGRESS TO BE COMPLETED IN 2016 | | | | | | |
| 1 | Develop and Implementation of Watershed Restoration Action Plans (WRAP) as identified in the GYA Priority Watershed Restoration Strategy, June 8, 2015; updated July 12, 2016 (Details Below) | 2017 - 2021 | Issues 1, 2 & 3 | All GYA Units | Complete WRAPs to identify essential watershed improvement projects. Assist in the implementation of essential project in priority watersheds. | \$15,000 | All GYA Units & staff |
| 2 | Investigate Wetland Inventory Baseline Data Across the GYA | 2017 | | All GYA Units | Outdated and inconsistent Wetland Inventories exist across the GYA and need to be evaluated for update. | Unit Base salary to support initial effort for future funding requests. | All GYA Units & staff |

Current-Year (2020) and Out-Year (2021) Description of Work Associated to the GYH Strategy Base Funding

2020 - Funding and Workload Allocation of the \$15,000 GYH Strategy Base Funding

- GYA Priority Watershed - SNF Lower Middle Popo Agie Middle Fork Trail; Upper Wind Brooks Lake Footbridge (\$15,000)
- GYA Priority Watershed - CTNF Diamond and Lanes Creeks (\$15,100)
- Keeping Our Heads Above Water: Using Underwater Cameras to Inform, Educate, and Collaborate Through Story Mapping (\$8,400) *Funded through Fish Subcommittee*

2021 – Proposed Funding and Workload Allocation of the \$15,000 GYH Strategy Base Funding. *Proposals forthcoming.*

Appendix B: GYH Project Ranking Criteria

To assist the GYCC in selecting appropriate projects to address GYCC/GYH priorities the following criteria has been established by the GYH to rank future project proposals.

- How well does the project address GYCC priorities & GYH issues?
- To what extent does the project build external partnerships and leverage funds?
- To what extent does the project result in internal partnerships between units or result in wide-scale benefits for the Greater Yellowstone Area?

GYCC Proposal Ranking Criteria for Air Quality Proposals

- 1) To what extent does the project build external partnerships and leverage funds? “External partners” includes states, counties, towns, NGO’s etc. Contributions from partners can be “in-kind”.
 - a. 100% match (3)
 - b. 51-99% match (2)
 - c. 1-50% match (1)
 - d. 0% match (0)

- 2) To what extent does the project result in internal partnerships between units (e.g. those federal agencies who are members of the GYCC)?
 - a. Partnership with 3 or more GYCC units (3)
 - b. Partnership with 2 or more GYCC units (2)
 - c. Partnership with 1 or more GYCC unit (1)
 - d. Partnership with no other GYCC units (0)

- 3) Project results include wide-scale benefits for the GYA.
 - a. Project results benefit the entire GYA (3)
 - b. Project results will benefit one + GYCC units (2)
 - c. Project results are limited to only one GYCC unit (1)
 - d. Project results do not benefit any GYCC units (0)

- 4) Proposal clearly addresses one of the outcomes and measurable outputs developed by the GYH sub-committee.
 - a. Project serves as a model that can later be repeated in other units (3)
 - b. Project outcomes/outputs are clearly defined AND proposal includes plans for how information will be used/shared (2)
 - c. Project outcomes/outputs are clearly defined (1)
 - d. Project outcomes/outputs are vague and not well defined (0)

- 5) Proposal addresses a new, ongoing or critical need.
 - a. Funding is for a previously unaddressed outcome or need (3)
 - b. Funding is for an already ongoing or repeat project which is critical to an outcome (2)
 - c. Funding is for new component to an ongoing or repeat project (1)

- d. Funding is merely multi-year funding for similar work over repeated years (0)
- 6) The proposal has the ability to achieve goals both within the stated timeframe and requested funds.
 - a. Goals are readily attainable, both within the stated timeframe and budget request (3)
 - b. Goals are attainable, but may need some modification as to timeframe (2)
 - c. Goals are attainable, but may need additional funds from other sources (1)
 - d. Goals are not reasonably attainable (0)

Maximum score = 18 points

Outcomes not recommended to be pursued via the GYCC project funding process

Correlate stream types with plant community types

Better define stream discharge/sediment transport relationships

Headwaters conference