
UPPER MISSOURI BASIN ADVISORY COUNCIL

PHASE I ISSUES SCOPING

RAW INPUT AS OF OCTOBER 20, 2013

BASELINE PLANNING INFORMATION FROM COUNCIL KICKOFF MEETING

Below are notes from the "Sector" presentations from the Council's Kickoff meeting on September 5-6, 2013, in Three Forks, Montana. Meeting audio can be provided upon request for further detail.

AGRICULTURE

WHAT'S WORKING WELL

Flood irrigation is working; lots still occurring; very labor intensive; not very efficient

Conversion to sprinkler working well too, but some implications – divert less, but may consume more (reducing return flow)

Some reservoirs can move excess to periods where needed. Ruby res released (35,000?) in late season

Some crops match water availability more than others (dryland); hay crops are more likely to have shortages later in the season

OVERSUPPLY

Runoff may be more than needed; but even runoff in a dry year may not be enough

SHORTAGE

Dry years in Aug; especially where no major storage project. Even storage projects can be subject to shortage

Can have shortage early, before runoff. Cold temps kept snow in mountains, but irrigators wanted to turn on

PROJECTIONS

Shift to sprinkler irrigation

Headwaters areas showing decreases in irrigated acres (possibly converting to development, or economic factors, or both); increases in middle Missouri/Chouteau/Teton county areas.

May see shift in crop types grown – hay and pasture = 75%, barley and wheat make up the rest. Maybe more toward potatoes in future – different water demands

Surface water diversions for irrigation are 98% of total

Likely continued focus on irrigation infrastructure – e.g., work on Ruby Dam.

Some smaller laterals (even to sprinklers) being put in pipes; maybe some lining of larger canals

As water becomes more valuable, water will become more tightly managed.

DATA GAPS

Differences in evapotranspiration between sprinkler and flood irrigation

Some additional information was exchanged through question and answer sessions with the presenters which is not summarized here. Relevant aspects were incorporated into summary materials.

FISH & WILDLIFE

WHAT'S WORKING WELL

Partnerships are working well where can maintain flows for f/w needs – e.g., Jefferson (would have otherwise dried up at Waterloo); BH has good drought plan – shared sacrifice. Voluntary – require trust and understanding.

OVERSUPPLY

Not much of an issue. Nests might be flooded. Can be physical damage (but tied back to land management). Flooding can be beneficial for fish; sometimes higher flows combine fry with bigger (predator) fish. Bell Creek flood took a lot of banks, especially those that were unvegetated.

SHORTAGE

Shortage is rule. 200 miles of Teton that doesn't flow. People working hard to try to address. Not just summer. Fish kills are the shocking events for public. Worried would have big kills this year, but partnerships probably saved them.

Wet-P inflection points where rate of change drops. Data for Smith showing biological ties to numbers.

Temperatures in Madison – PPL runs water down to reduce temp. Less water, the quicker it warms.

PROJECTIONS

Consensus that conditions are warming. Precipitation predictions uncertain. If changes in timing and type, will affect f/w. Outlook not good for f/w. Tree ring studies in greater Yellowstone show drops in mid-1900s and 2000s; same for northern Rockies.

If don't get low elevation snow, will be worse for fish.

Well drilling in Gallatin County 600 wells/yr in late 90s

Private ponds are issue as well – evaporative loss, affects ground water

DATA GAPS

Effects of basin closure exemptions; illegal use of water (pumps in river); % of time that instream water reservations met.

Some additional information was exchanged through question and answer sessions with the presenters which is not summarized here. Relevant aspects were incorporated into summary materials.

INDUSTRIAL

WHAT'S WORKING WELL

(none specifically noted by presenter)

OVERSUPPLY

(none specifically noted by presenter)

SHORTAGE

PPL has 10,000 cfs claim for Cochrane Dam; water right not met much of year. Low flow years never met. Priority date is 1958 or 1960.

PROJECTIONS

Difficult to predict changes in demands; markets influence – mining, energy production (O&G), hydro, construction, non-ag food, paper products. Hydropower likely biggest player. Construction more related to municipal demands. Mining has tapered off in many areas. Not a lot of O&G, but Bakken moving west. Plant proposed near Great Falls was going to use City of GF water reservation. Would have used almost all of City reservation. Paper products demand has fallen off – one mill in Townsend.

New hydro projects less likely than upgrades and retooling (i.e., Rainbow and Turnbull). Gibson and Clark Canyon have planned upgrades. Can get new water right because non-consumptive. Higher the head, the more generation.

DATA GAPS

(none specifically noted by presenter)

Some additional information was exchanged through question and answer sessions with the presenters which is not summarized here. Relevant aspects were incorporated into summary materials.

MUNICIPAL/DOMESTIC

WHAT'S WORKING WELL

Optimize and maintain existing water rights

Can acquire water rights or shares; also annexation requirements (or pay a fee)

System loss detection and repair

Planning is good rather than trying to fix later.

14 municipalities have water reservations

Well exemption – proposed rules out (comment by 9/19); works well in rural settings

Grey area – rainwater harvesting

OVERSUPPLY

Spring flooding; full storage is good; beginning of growth planning cycle

Abundant aquifer area

SHORTAGE

Droughts, fires, winter freezing, restricted or unavailable storage, basin closures

Drought, increased demand – can lower water table

PROJECTIONS

Conservation specialist soon to be hired in Bozeman

Climate change adjustments – Bozeman did models with and without climate change (*reference their projections?*)

Real time water use data – good for leak detection too

Funding needs? Prioritization of \$\$ (?)

Redundancy of supply/increased storage

Reuse/Purple pipe

See Bozeman info on website and handout

DATA GAPS

Wastewater reuse – e.g. Bozeman discharges to East Gallatin; EPA going toward land application and reuse. If required treatment, no water right change needed. Probably will be decided through case law. Lagoons have had to be

Lack of good estimates of available supply and existing legal demands for basins

Lack of groundwater details (supply, timing)

Some additional information was exchanged through question and answer sessions with the presenters which is not summarized here. Relevant aspects were incorporated into summary materials.

RECREATION/TOURISM

WHAT'S WORKING WELL

Resources in good form

OVERSUPPLY

Flooding, high storage in reservoirs (limit water in rivers); safety concerns. All seasonally based.

SHORTAGE

Low flows can result in fishing closures (e.g. Blackfoot closed)

2012 recreation surveys; need more lake and river boat access

PROJECTIONS

16% of Americans went fishing; 29% fish or hunt; 38% of (US) boating trips include fishing

Newest participants in fishing are women and youth.

Non-res license purchases increased 5%

MA – drop in use numbers in 2011 was partially due to high water and not being able to go

84% of anglers participate in other activities.

Water access is top need (2012 survey of land managers)

2010-2030 percent pop change – 10-20% projected growth (more by county on audio)

12% total pop increase by 2030. = more demand for water.

DATA GAPS

Recreation is hard to track, especially non-register data. Would help to correlate growth with user demand or preferences.

Some additional information was exchanged through question and answer sessions with the presenters which is not summarized here. Relevant aspects were incorporated into summary materials.

ADDITIONAL BASELINE INFORMATION FROM INDIVIDUALS ASSOCIATED WITH PUBLIC MEETINGS

This is grouped by topic, rather than displayed by location. Not all entries closely match the headings under which they were provided. All providers of information in this category provided their contact information for follow-up if desired, except for the entries in *italics*.

WHAT'S WORKING WELL

- Basin closures work well. They spur innovation in water management, and make Montana a national leader in managing a limited resource wisely.
- State water law if adjudicated and enforced
- Inefficient water use in the upper Big Hole; sustains the rest of the River system
- No new appropriations
- No Prioritization of beneficial uses - all are equally important
- Prior appropriation doctrine - 1st in time, 1st in right (critical to upholding the work of the water court)
- Comprehensive, locally based, flexible management systems developed by district courts and water commissioners like in Gallatin County and watershed groups like Blackfoot Challenge and Big Hole Jefferson River drought plans.
- Need to continue (better) treat both ground and surface water as parts of a combined resource - need joint management working together to address concerns, e.g., drought management plans

- *The system of "first in time, first in right"*

- Water commissioner on Upper Teton, so all users "play by the rules"

- Since water is priceless as a commodity, we need to store as much as possible for the low water times it could be used for recreation, fisheries, etc.

- No change to any storage of water already in place.

- Water rights are property which can be sold/severed from the place

- Having input as general public

OVERSUPPLIES

- Don't assume high spring flows are surplus until biologists determine the magnitude, duration, and frequency of high flows needed for healthy rivers.

- Water running over the border - we need to slow it down and use it many times

- Cloudbursts and flashflood from rapid melt or storm cells - could be diverted into catchments

- In cases that are unregulated, like ponds - groundwater ponds are consuming our most valuable resource, often just for decoration.

- No oversupply anywhere, anytime. We have a relatively fixed baseline amount to allocate among all beneficial uses. A plan needs to be developed to allow for re-allocation of short term oversupply (spring flood, heavy rains). Storage in a reservoir, water banking/trading, instream flow, blow off on irrigation ditches. When oversupplies exist, the plan designates alternative options for allocation of that water.

- Healthy watersheds absorb excess water- floodplain, wetlands, stream corridors, filter it and support groundwater storage.

- High water years during peak flow run-off - sometimes flooding

- Need to get people and structures out of floodplains. Stop federal flood insurance.

- *None*

- Sun River - spring runoff

- No storage leads to a constant flow on the Teton River for El Dorado water right

- From pivot irrigation efficiency - Could be utilized in fisheries, additional irrigation and to assure downstream water users have water for their use.

- Too much for recreation vs. domestic use

SHORTAGES

- High flows for river habitat maintenance on Marias and other regulated rivers. Rivers need a flood at least every 10 years, and bankfull flows every 2 years. Most instream flow rights are not monitored or enforced.

- Summer low water flows
- September, August, July
- Too little for fish and wildlife, especially on tributary streams where there are no user groups or are decreed.
- All beneficial uses claim they aren't getting all they need. When supplies are low, there has to be a plan for re-allocating water (rationing). Some of this is already in place - District Court and water commissioners, odd-even lawn watering, late summer-winter instream flow (Big Hole/Jefferson).
- Instream; too numerous to mention all, e.g., Sun, Teton, Prickly Pear, Tenmile, Dearborn, Big Hole, Jefferson, Boulder, Deep Creek (Townsend), Lower Gallatin. For aquatic life/"ecosystem services", recreation, usually after spring runoff through rest of hydrologic year.
- *Most tributaries in the plains have less water in mid-summer to fall. Only 1st or 2nd water right holders on the upstream have water throughout the irrigation season*
- Sun River - (Greenfields Irrigation District) fall irrigation
- Teton River at confluence to Missouri
- Downstream users of Teton often are without water even though (they are?) senior water rights owners, due to upstream more efficient use of water through pivots and less wastewater returned to stream
- Sun River drainage needs more off-stream storage!
- It seems some Fairfield people don't have enough water at times

PROJECTIONS

Note that many of the entries below actually identify desired projections, rather than available ones.

- Habitat disruptions caused by "efficiency upgrades", to ditches/canals. Negative effects on habitat (predators, grouse, etc.)
- Possible development of a water (?)
- Climate change/USGS runoff data in relation to use dates
- Coordination of plans for urban water supplies with other uses. (they don't exist in a vacuum.)
- Climate change projections affecting water supplies from high country federal lands. (state gov't, USFS, U of M Forest School).
- Bureau of Mines - Tom Michalek, Steve Custer (MSU), Gallatin local water quality district well logs, irrigation district records.
- *Until the DNRC and Water Court have finished adjudicating the water rights in the state, we won't know if there are any waters available in the various basins. Expansion from 1980s has caused serious problems*
- Invasive aquatic species - Eurasian water milfoil, zebra mussels

- Continued surveillance of runoff and waste water remains clean and is quality for downstream use
- Water quality - no mention of pollution levels
- The August/September 2013 issue of *Planning*, the national magazine of the American Planning Association, contains two articles related to trends in municipal water use. Combined, the good news is that per capita water consumption in the West has dropped significantly, and the bad news that droughts in the West put water supplies at ever greater risks. APA members can access the articles at <http://www.planning.org/planning/2013/aug/waterdemand.htm>; others can obtain from their library.

DATA GAPS

- The process needs a decision support system (DSS) that maps water availability by stream reach, including tributaries, under different management scenarios. See examples from Colorado, Texas, Michigan, North Carolina, Florida, Massachusetts - all used different methods. Need quantification of water diversions and return flows.
- measurement, measurement, measurement - go Mike Roberts and USGS!
- Uses of water via urban sprawl and development in riparian zones, including exempt uses of water
- Little information is available on total water quantity within the state when groundwater and surface water are considered
- Modeling for increased demand and decreasing supply.
- Can we get an estimate of the total average streamflow from gauging station data for each watershed? Can we add up the total amount claimed by senior water right holders in each watershed? By subtracting, how much is left for junior water right holders? Can we find surplus or shortages that way? For surface water.
- We really have little data on actual quantity of groundwater or effects of current use on aquifer. How can we allocate water if we don't know how much we have?
- Impacts on water resources in general in conversion of flood to sprinkler
- Future demands from stock/domestic wells through "exempt well" permits
- Need to address within basin closure over-allocation and impacts to existing rights
- Better planning for continued long-term gauges at more critical locations.
- "Real" rights versus "paper" rights in basin (actual versus claimed water use) and wasted water
- Better characterization of groundwater hydrology in areas of high population density
- Ensuring water availability across the state for ag, industry, and recreation
- Develop a water solution for expanding residential development over the long term
- Encourage innovative water use practices for all users
- *Making measurement of streams a priority. Fund USGS gauging stations for full year of data collection*

- Link between ground water and surface water
- Need for public education beyond agriculture and some serious thought to use of grey water as well as water savings in urban areas and in the expanding development areas. Programs to promote efficiency such as new water saving toilets, underground sprinkler systems for lawns, etc.
- Data on measurement
- Study further measurement of surface water and ground water

COUNCIL AND PUBLIC MEETING GROUP "TOP THREE" ISSUES, BY LOCATION

This compilation lists the "top three" group issues from the Council's Kickoff meeting, as well as the public meetings held in Great Falls, Conrad, Helena, Bozeman, and Dillon, respectively, from September 30 to October 9.

COUNCIL KICKOFF MEETING - SEPTEMBER 5-6 - THREE FORKS

TABLE 1:

1. Limited water supply; can't create new water.
2. Water banking - create certainty in specific areas.
3. Water right enforcement to create more certainty.

TABLE 2:

1. What water is available, when? Need to know.
2. Can water policy be a bit more flexible? Need flexibility in how move water around.
3. New system to measure surface water for better idea of what's really going on and the ability to look at new storage - capacity of what we have, retrofit?

TABLE 3:

goal: improve and guide future

1. maintain this work by funding local basin user groups - provide them with document to market.
2. irrigation - growth projections and change in methods - effect on gw as source and related to recharge
- 3.1. surface water storage role in irrigation?
- 3.2. Add water quantity and quality data from non-traditional groups; include local knowledge and information (may need data quality evaluation); make available for public access - e.g. FWP, DEQ, DNRC information that people normally don't know about.

TABLE 4:

1. Everything is connected - need better understanding of how uses affect others.

2. There is an incomplete understanding of the water cycle, given human influences (e.g., wastewater discharge, sump pump issue at Malmstrom, etc.)

3.1. We need a water balance - how much is there? Conditions are difficult to determine (e.g. does the shift from agricultural uses to housing use more water or less?)

3.2. Water availability and use will change as climate changes

TABLE 5:

1. There is a need to balance instream flows with agriculture, especially in dry years, and deal with associated challenges.

2. There is an opportunity to increase storage of high spring flows. We should plan on an earlier snowmelt. Reservoirs, groundwater recharge, beaver dams, wetlands, and forest watersheds with proper stocking can all help take advantage of high flow periods.

3. Need to balance surface water and groundwater uses (i.e., conjunctive management). For example, canals can help create a groundwater reservoir. There is a connection - we should recognize it and use it.

GREAT FALLS PUBLIC MEETING- SEPTEMBER 30

TABLE 1:

1. Water storage

2. State needs stronger methods and ability for setbacks and tougher enforcement with DEQ to have more power to protect water quality.

3. Protecting points of diversion related to avulsion.

TABLE 2:

1. Protect and maintain prior appropriation doctrine

2. Utilize high water for future growth (storage on or off stream)

3. Infrastructure improvements for all water users.

TABLE 3:

1. Need for more information on quality and quantity and their relationships.

2. Ensure industrial uses are continued assuming quality and quantity requirements are met

3. Offstream storage

TABLE 4:

1. More water storage

2. Finish the adjudication and implement

3. Improve ability to improve cooperation that will facilitate improved overall efficiency

TABLE 5:

1. Continue to improve water conservation measures (pivots, pipelines, measurement devices)
2. Ability to store high spring flows - structural, or...
3. Worry of losing portion of water right as become more efficient.

CONRAD PUBLIC MEETING- OCTOBER 1

TABLE 1:

1. Capitalize on high spring flows - natural storage (cost effective?) - address likely increased demand
2. control and prevention of invasive aquatic species (all users) - dangerous if gets out of hand
3. Out of state, downstream calls for water, increased demands, tribal demands, international demands - how to accommodate

TABLE 2:

1. Tribal Reserved water - what volumes they end up with and how will it be used - mitigation (Blackfeet)
2. Water supply/availability - opportunities; small watershed, so need more storage
3. Funding for water efficiency and conservation project - agricultural

TABLE 3:

1. Storage - all kinds; off-stream, expand existing, wetlands - biggest question is cost
2. Infrastructure improvements - measuring devices, storage/canal infrastructure - both funding and implementation
3. Adjudication complete and enforce rigorously.

Other - downstream demands

HELENA PUBLIC MEETING- OCTOBER 2

TABLE 1:

1. Utilization of stored water such as in Tiber reservoir and the rest of the dams in state, including increased storage capacity on or off river.
2. Protecting senior water users from groundwater depletions from exempt wells exemption (35/10)
3. Increased information about water resources - accountability and measuring use, including future use and supply.

TABLE 2:

1. Ensure water availability across state for ag, industry, recreation and municipalities.

2. Cooperation and communication among stakeholders using good information - need more; good information helps advance cooperation. (e.g. benefits of measuring devices on 3 big canals on Jefferson system and related diversion reductions)

3. Future changes in hydrology due to climate change/variability; changes in timing and availability of water.

BOZEMAN PUBLIC MEETING- OCTOBER 8

TABLE 1:

1. Ensure legal protections for perpetuation of agricultural economies and water use.
2. Conservation enhancements to promote water storage in natural ecosystems - all users can be involved (industrial, hydro, recreation, etc.). Allows water to stay in system longer.
3. Climate modeling and water supply analysis would help how current uses will look in future.

TABLE 2:

1. Water Plan should include accurate, conservative assessment of water use - include climate change, and water adjudication process.
2. Goal of Plan should be to achieve/maintain instream flows in our rivers.
3. Provide education and incentives to reduce water use and tighten up on basin closure well exemptions. Embrace municipalities as partners in conservation efforts.

TABLE 3:

1. Lots of agencies and organizations collecting data, but not centralized. Could bring data players to table and facilitate more effective dialogue. Can one entity get access to (and evaluate) all the data? Databases need to talk to each other.
2. Water quality/quantity - preservation of watershed capability to provide clean water. Minimum streamflows also quality related - need to know about flow to talk about TMDLs.
3. Preserve water supply from forested lands; and consider wastewater reuse as component of future supply.

TABLE 4:

1. Data - Need consistent and credible data of water resources - use, location, historic use. Need expertise to put it to good use. Ensure availability of data to other users and public. No agency hoarding!
2. Consumptive use impacts downstream and to other uses - plan for more water marketing.
3. Water quality/ quantity disconnect - treat equally.

DILLON PUBLIC MEETING- OCTOBER 9

TABLE 1:

1. Accelerate adjudication process.

2. Off-stream storage specifically for Big Hole river - could help downstream systems.
3. Instream enhancement through cooperation of water users across state. Incentivize voluntary participation.

TABLE 2

1. Need storage of high spring flows in Big Hole; traditional as well as storage of surface water in subsurface aquifers.
2. Improve forest health and management in watersheds and mitigate effects of forest fires and oversupply of fuels.
3. Improve stream gauging system; improve sharing between agencies and public access to data. In part to help determine effects of return flows to stream; help better manage water.

TABLE 3

1. Adjudication process - need to ensure special interest groups don't slow down process or create unnecessary fees on water users. (e.g., TU involvement, and landowners can't afford to fight).
2. Water marketing and tie between rights and land - value of water will increase so much that can't afford to keep land in family. Threat to family farms.
3. Senior surface water rights need to be protected from new groundwater wells. (includes exempt wells and others)

TABLE 5

1. Funding of the adjudication process - need earmarked revenues and oversight. Streamline the process, develop timelines that are met. "Litigious individuals and greedy lawyers"
2. Use of ESA as weapon to change land and water use and impact on Montana Water use. Eminent domain, public trust, and downstream demands threaten Montana water law.
3. Climate change affect on period of use.
- 3a. Increasing Storage - off-season and offstream and groundwater aquifer recharge. (ID using existing irrigation infrastructure to recharge in off-season.)

TABLE 6

1. Need information about transferring water rights in estate settlements and sales of property.
2. Will early water rights be sustainable - 1865.
3. How will water rights be affect by tribal claims?

COUNCIL AND PUBLIC MEETING RAW (NON-PRIORITIZED) GROUP ISSUES

The issues below were those the groups listed, that either did or did not get reported out in the Group's "top three". They may also have been morphed into a broader topic reported in the group's top three, above. These are reported verbatim, as there was no opportunity outside the group at the table to further clarify.

COUNCIL KICKOFF MEETING

Groups 1 and 4 did not provide their issue forms, so their raw group issues are not listed below. Their top three issues were reported at the meeting, however, so are included in Appendix A and in the Issues Summary.

GROUP 2

- Water supply is finite and changing (timing)
- Technology is changing (GMOs, irrigation, etc.)
- Need numbers - water measurements (hard data)
- More water commissioners?
- There are also outside influences (climate or disasters - e.g., hailstorm)

GROUP 3:

- Growth Projections
- Water storage
- Habitat preservation
- Irrigation - will there be resistance?
- small wells
- Data from non-USGS/BOM
- Common interests, cooperation, user groups
- Additional groundwater data
- Handling of conversion of agricultural rights to municipal
- Marketing ideas/education - brand scope with personal touch

GROUP 5:

- Need to balance agricultural irrigation water with instream needs
- Water rights transfers should consider more than volume of flow
- After adjudication, many will have less water
- Balance among uses in dry years
- The Blackfoot Compact (met? can't read writing) a huge reduction; perhaps wastewater reuse?
- Need to capture high spring flows
- Fire control policies can affect water yield, quality, and timing

- One size doesn't fit all; local improvements can meet local conditions, and management must recognize these differences

GREAT FALLS PUBLIC MEETING

TABLE 1

- Water storage
- Water allocation for senior water rights
- Water issues to be discussed in Blackfeet Compact for water in Tiber dam re: a water right change process and reallocation
- Reservations need to have a long-term contract (with?) the federal government
- Use of temporary water rights
- Points of diversion on the Marias River has changed
- What will a simple procedure be to enforce water rights when all water has been adjudicated?
- Conservation districts wanted a setback and were not allowed with return flow (contaminants?)
- Tougher enforcement (and need?) to have more power to protect quality of water - consider it a major issue

Jim Beck summary of Table 1 Dialogue: Water storage below Great Falls dams; water allocation issues; contract water study (how much water), education on ability to utilize contract water; Look at exchange system to use contract water above storage; Look at exchange - off reservation use during compact negotiation; Concern with out of state interests looking to export water; Extend reservation development past 2025; Enforcement procedures that are simple and inexpensive; Setbacks to improve water quality; Better enforcement of point source pollution; let DEQ do their job.

TABLE 2

- Protect and maintain prior appropriation doctrine
- Future water for growth - including municipal - utilize high water storage
- Improve infrastructure for agriculture and municipalities
- Concern for protecting current water use

TABLE 3

- Possible industrial supply issues with demands for process. Where does it come from?
- Lack of measurement of water use - Need information to compare data. Stream gauges are being phased out. Who pays and why?
- Exempt wells are an issue in subdivisions. What size is reasonable?
- Know the relationship between ground water and surface water better. Who is responsible for monitoring?

- The quality of water and pollution factors
- Make sure that all industrial uses are continued as long as water quality is met
- Irrigation - measure very closely. More off stream storage would be an answer to the competition
- Information not readily available to the public
- Quality/Quantity
- Off stream storage

TABLE 4

- Improving amount of water storage, especially spring runoff for use later for use and stream flows
- Concern of water banking raising price of water, especially for agriculture
- Irrigation needs to be thoroughly evaluated, pros and cons, and long term effects on uses
- Water laws need to be looked at to improve better cooperation and win-win/outcomes
- Are we truly understanding the changes and impact going from flood to sprinkler, and agriculture to residential?
- Adjudication completion and real enforcement
- Not enough monitoring on surface water
- Need a means for improving infrastructure

TABLE 5

- Water conservation measures/pivots, pipelines, measurement
- Keep water in the state as beneficial use
- Complete water right compacts that are outstanding
- Storage of high spring flows
- Worry of losing a portion of your water rights as you become more efficient

CONRAD PUBLIC MEETING

TABLE 1

- Water commissioners would be useful
- Hope that senior water rights and property rights are respected
- Spring flooding - Sun River (disaster?) issues
- Late-year shortages

- More storage is needed to prevent spring flooding - Sun River, Teton
- Downstream user calling for water (e.g., Corps of Engineers)
- Funding for storage, efficiency, conservation
- Quality of water - invasive aquatic plant and animals - prevention and control needs to be better funded
- Determination of waste and beneficial use and who determines

TABLE 2

- Eminent domain
- Supply - storage
- Funding for conservation and efficiency

Jim Beck summary of Table 2 Dialogue: Eminent domain of water rights; Tribal water (use of water on reservation (OK), concern with sale of water from Tiber Reservoir, claiming an earlier priority for Tribe); Supply issues, possible storage sites (funding for efficiencies, conservation measures to save irrigation water); 4 Horn Reservoir expansion (Badger Creek) and distribution of water among several streams

TABLE 3

- Storage - who pays? DNRC process difficult. Needed - where/what kind. No only off-stream
- Adjudication and enforcement needed
- Efficiencies/water measurement devices
- Surface/Ground water depletion/connection
- Conversion to sprinkler and return flow issues
- Infrastructure improvements - who pays? partnerships; local/state/fed/NGO

HELENA PUBLIC MEETING

TABLE 1

- Tiber reservoir water not being utilized appropriately, belief that it's been abandoned, other potential lost water rights (and other dams).
- More storage, for more irrigated acres, off or on stream, concern with potential evaporation, e.g. Tiber and Fort Peck - including management
- Protect prior appropriation
- Small well exemption - cumulative effect
- climate change - stream flows, runoff, etc.

- water measurement, must have measurements to understand, measuring diversions
- Coordination between owners/operators of storage.
- Understanding the "finiteness" of ground and surface water, and sustainable use.
- Cost of water right acquisition/change of use.
- Growing municipalities/population and suburbanization, general development
- Quality of water

TABLE 2

- Cooperation and communication between water rights holders (stakeholders)
 - DNRC water rights process needs to improve
 - Good information - measuring devices and feedback to communities
 - Future changes in hydrology due to climate change/variability - changes in timing and availability
 - Ensuring water availability across the state for agriculture, industry, recreation, and municipality
 - Encourage innovative water use solutions
 - Develop a solution for residential development, i.e., exempt wells
 - Complete the adjudication
 - Consider groundwater recharge for storage (ASR)
 - Better understanding of groundwater flow
 - Off stream storage on tributaries
- Jim Beck summary of Table 2 dialogue: Cooperation and communication among water right holders is a good way to make the best use of water; Measuring devices help to take arguments out of water use; Communication was begun through watershed group with door-to-door efforts; Future changes in hydrology may change amount and timing of water; Water availability in general across state for ag, industry, recreation, and municipal; Plan for residential water use in the future; Encourage innovative use of water; Exempt right to be reviewed to show lack of impact or mitigation; Expedite the water adjudication program; Water marketing for small users?

BOZEMAN PUBLIC MEETING

TABLE 1

- Recreational uses of water - (*allocate?*) water for recreational and fisheries uses
- Agricultural uses of water - Water measuring devices - legal protections need to be implemented to assure agricultural uses

- Water storage to maintain base flows and (*base?*) uses for all the users (industrial/agricultural/municipal).
- Hydropower users - water availability for power production and hydro is a major water user though their rights are very young.
- Climate modeling and water supply with current and project uses from a planning perspective (Kansas example) - soil health enhancement for water storage/offstream storage (?)
- Conservation enhancement that promote water storage within natural ecosystems.

TABLE 2

- Getting a really accurate and conservative assessment of future water availability. Use a conservative approach in projection (in relation to climate variability)
- Water adjudication needs to be completed/expedited.
- Document the inter-relationships between surface and groundwater
- No more exempt wells for certain purposes - ponds, waterfalls, decorative, front lawn recreation.
- Encouraging xeriscape development; potentially offering incentives for landowner
- State water plan should include water quality issues also
- Specific actions that enable water users to conserve water - using science and irrigation (Big Hole irrigation example)
- State continue to educate on water marketing, water leasing, etc.
- Work with municipalities to develop conservation strategies - expand and promote with municipalities that already are doing some conservation
- Stormwater
- Grey water/purple water
- Have instream flows as a goal within the state plan

Jim Beck's summary of Table 2 discussion: Estimate of future water use, especially in light of climate change. Use a worst case over 20 years; Adjudication needs to be completed to understand water use and facilitate changes o water; Protecting instream flows by prioritizing instream use; Understand/Document relationship between ground water and surface water; Limit exempt wells (permit) for some purposes; Requiring new subdivisions to xeriscape; Consider water quality along with water quantity; Increased water enforcement of water rights/water use; Voluntary conservation initiatives - Educate people concerning better use and conservation; Continue with state education on water use and water savings - More educational activities by joint government agencies, maybe with other entities; Awareness of water savings in the municipal setting (sod farms to supply lower water use grass)

TABLE 3

- Water Use Efficiency - usage of water, conservation, recharge, allocation short term high flows. Irrigated acreages. More water use not going back to recharging aquifer. Crop properties, ET rates. Usage vs. recharge. Water budget per watershed.
- Water Quantity/Quality - TMDL, preservation, wastewater, recycle. DEQ vision; DNRC vision; NCAT. At base flow what are the impacts of contaminants? Posing futuristic perspective to growth. Wastewater. TMDL - Preservation, coordination, watershed protection.
- Data - Ground/Surface water interchange, data quality and quantity, communicated data, NRCS, FS, watershed council. Funding. MBMG/GWIP. Substantial database. Funding. Data gaps?
- Land Use Planning - Industry, residential expansion vs. agriculture. Industry uses impacting quality. Frac'ing water user on rocky mountain front; expansions in subdivisions.
- Water Supply and Wastewater - recycling, deficit, increasing supply. Reservoir possibilities capturing flood discharge. Subdivision planning - drawdowns cause neighboring impacts; what happens? Wastewater
- Watershed Protection - source of water. Better preserving the water source.

TABLE 4

- Consumptive use - Recharge
- Analysis of Use - Policies should be based on credible data
- Downstream demands
- efficiency upgrades (conversion to pivots)/recharge
- Historical data and levels
- what types of aquifers are we dealing with for groundwater (confined vs. open aquifers)?
- Limit analysis to factual data, credible data
- Importance of baseline data. Coordination of efforts between agencies. Sharing of data.
- Water accounting, budgeting, mapping of use (ditches/canals)
- Water quality
- Instream flows
- Identify rights that are not being used.
- Have expertise to deal with the data
- Mitigation
- Deal with over-allocated water

DILLON PUBLIC MEETING

TABLE 1

- Instream flow management with cooperation of watershed and conservation groups.
- Offstream storage, specifically for the Big Hole, holding on to early flows
- Floodplain law enforcement - site specific
- Adjudication process speeded up on upper basin rivers - proper funding from the Legislature
- Climate change and future water supply

TABLE 2

- Address the irrigated pasture clarification issue
- Big (*fires too*) because of consistent rainfall (?)¹
- Irrigation tactics. Return flows lessened by irrigation technology. Also divert less water. Compensate so farmers don't lose water rights from more efficient irrigation.
- Improve water gauging stations; improve state sharing of water data.
- Recreation "open spaces" not connected to agricultural benefits of open land. Open spaces are due in large (most) part to irrigation, agriculture. Without agricultural management, tourists wouldn't have the scenery.
- Accounting for and protecting sub-irrigation on edges of streams and (*water surfacing?*)
- New streams being built from bringing groundwater to the surface. More information on groundwater. Developing groundwater and the effect downstream.
- Diverting high water into storage solutions. Storage options on Big Hole. Catch high water from Big Hole. Funding options for storage solutions? Public relations - (*awareness, to crowdsource*) the solution. Hydro opportunity?
- Beaverhead winter flow management plan. Balance management with Corps of Engineers.
- Cloud seeding in Idaho. Power companies that benefit from seeding. Taking our water.
- Improve watershed. Mitigate fire risks in forests to avoid hydrophobic soil. Age diversity.

TABLE 3

- Use date/period of use for water rights, in relation to climate change
- Not to sever water rights from the land - leasing vs. separating; private property rights?
- Moving water out of state

¹ This doesn't make sense; if someone from that group can clarify, please do.

- Value of water, water marketing; as value of water increased, creates threat to family farms. Estate taxes increase with increased land/water value. Not selling water right if it has an adverse effect on other landowners??
- Allowing special interest groups to object (have a say) in the adjudication process.

(no Table 4, as several attendees left at break)

TABLE 5

- Timing of water right. Period of Use. Changing seasons.
- Funding (earmarked and oversight) of adjudication - streamlining processes and develop timelines that are met.
- Storage - offstream and groundwater - augment groundwater storage, mitigation - run canals off season - irrigate off season.
- Vegetative manipulation and water budget (logging, fire) - too many trees.
- Use of ESA as a weapon to change land and water use; trumps state law.
- Eminent Domain - downstream uses - commerce
- Domestic use - National Federal Reservation Act. Be careful about allowing Public Trust Doctrine to fracture Montana water law doctrine!

Jim Beck summary of Table 5 issues: Period of use change with climate change making earlier/later period appropriate; Finish adjudication in Montana with specific funding to accelerate the task with oversight; Toughen the adjudication system to cut out delays, hold people to schedules; Offstream and groundwater storage using recharge via ditch operation or hybrid irrigation methods w/protection for converting back and forth; Manage forest to lessen the use by excess tree cover; Controls on water banking; Eminent Domain may be used to supply water for barge traffic or large cities.

TABLE 6

- Eminent domain for the water rights
- Early water rights
- Early Native American rights
- Transferring water rights in estate settlements
- Early storage collection in the spring

INDIVIDUAL INPUT ASSOCIATED WITH MEETINGS

Some of these topics were covered in public meetings, and attendees provided them again for emphasis. Others were provided because attendees felt their group results were not representative of their interests. Some was provided by people unable to attend the public meetings.

ASSOCIATED WITH COUNCIL KICKOFF MEETING

- Respect the historic rights utterly.
- Storage optimization is likely the only option for "adding" water.
- Add to true "net" effect understanding of leaks, well/septic systems, infiltration, and the like.
- Near-urban circumstances are different than rural, and require a different approach.
- Natural streamflow regimes are greatly altered in many places, resulting in adverse impacts to fish, wildlife, and riparian vegetation. But we don't know the degree of alteration for individual stream reaches, which we need for planning purposes.
- Water planning in a sense is land use planning. Make the connections between people's behavior and impacts on water supply.
- Ask the question how can development/growth meet future water supplies, not just how water supplies can meet future growth. Conservation should be included as a strong perspective.

ASSOCIATED WITH GREAT FALLS PUBLIC MEETING

- The general system of water rights works good but it is not flexible enough in these ever changing times.
- We really need lots **more enforcement** AND it should not have to come to light from only written complaints. Most water right holders I have met do not like to turn in their neighbors even if there is really bad "stealing" of water going on. If DNRC knows of a water right violation they should be able to do something about it.
- **Adjudication needs to be completed ASAP.** This drawn out process is having long-term negative effects on people trying to work together to resolve complex water issues.
- **Water conservation project should be rewarded** not punished as is the current water rights system. If someone saves water they should be able to keep that water right and allow it to remain in the river.
- **Water storage always sounds great but** who is going to pay for the installation and the long-term maintenance? There is already a huge backlog of maintenance on irrigation infrastructure without adding more. And there is already a state water storage study that does not show many good/cost-effective sites remaining.
- Need **more monitoring of stream and irrigation diversions.** Monitoring is a good way to make sure people are being honest of what water is going where. Do not need all USGS sites but we do need lots more sites that are considered reliable.
- **Proactive drought management by state and federal agencies needs to be a priority for proactive on-the-ground water conservation projects.** Why do we need to always talk about drought? Lets do something about it. Should be a regular review of state and federal resources that can help us find real water savings since we can make any more new water.
- **Tie between GW and SW** needs to be cleared up and be available for decision makers. Why do we allow new subdivisions to go in when there is already major water shortages in certain areas. If the desire for growth is there,

they need to acquire existing water rights. General public is too poor to find out the real facts on potential impacts of new GW projects.

- **Teamwork needs to be rewarded.** If I find a group of people willing to work together to share water, they have to fight the system of even potential loss their water right because they did not use all of their water.

- Efficiency upgrades and conservation measures with use of water

- Water banking

- Both in and off-stream storage

- Education regarding excess water with use of pivot irrigation vs flood irrigation available for other use.

- Montanans must be better stewards of our water or downstream states and users could take this scarce resource (needed?) in our semi-arid region.

- Measurement of water quality and reporting on a regular basis to the public

- Want to know the impact of water needs from oil industry on Montana's supply

- Would like to see more than water rights owners be involved in Montana's water systems

- Worry about PPL having tons or rights to our water when citizens don't and can be trampled by big money and businesses

Participant Note: Had mine employee ramrod her desires for use of water into (group) priorities without agreement of group participants.

- Be in control of Montana water to out of state uses and users. Don't sell our rights to the water. Keep ability to control it.

- Legislatively change "abandoned" water rights. Water rights belong to the land no matter what when purchased. I live in town; is it fair to take my property rights as for the producer when no all rights are used?

- Issue of conserving water also punishes landowner because they didn't use all the rights

- Can we agree that we have a finite supply of both surface and groundwater.

- What are the projections for pivot use into the future?

- What is the biggest benefit to society in the way of food. Is it better if we transport water in order to produce more grains, vegetables and fruits? Or is it better to produce livestock?

- What is the tipping point for water as a commodity? When does it become profitable to sell water as a commodity instead of using it for agriculture.

- How much groundwater do we have available and when do we turn off the spigot? As opposed to over (appropriating) it?

- What if anything are water users willing to sacrifice? And what is the cost.

ASSOCIATED WITH CONRAD MEETING

- Storage of high spring flows
- Defining waste issues and providing some teeth in statute to control
- Neighbors infringing on neighbors in the use of ground water wells

ASSOCIATED WITH HELENA MEETING

- Availability of water for development in urbanizing areas
- The state of Montana should challenge the Bureau of Reclamation's claimed water right. Tiber was commissioned in the late 40s and finished and filled in the mid-1950s. It was built to irrigate over 1 million acres. It currently irrigates less acres than the dam flooded in the mid 50s. 10,000 acres would be developed if this illegally tied up water were released.
- Prior appropriation doctrine
- Predicted changes with climate change. How will this affect water supply and hydrology? Need to be proactive to address future water needs - but be realistic (not "pie-in-the-sky" growth and development)
- Instream flow protection for aquatic life/ecological processes
- "Exempt wells" - need to be brought into water rights "scheme" and need to be "in line" for in-time rights like other rights
- Get through water rights adjudication process - now!

ASSOCIATED WITH BOZEMAN MEETING

- Data collection, analysis and projection (i.e., climate change modeling of demand vs. supply)
- Encouraging conservation measures for water storage and increased funding for such (i.e. soil health)
- ensuring clean and abundant water for all life forms in Montana (i.e., discouraging tracking). Develop agriculture, tourism, and conservation, rather than industry.
- Encourage ground-up involvement, not top-down.
- Federal lands along the Continental Divide are the headwaters of the headwaters. What happens there affects water supply all the way downstream. Take a close look at management practices on these lands and state/federal coordination on watershed protection issues. Can management practices on these lands increase water supply/stabilize water supply, store water in snowpack, wetlands or riparian flood plains, groundwater. How does climate change affect the water supply from these lands? USFS has done some work on climate change projection NEEDED - close coordination between state/fed/local on management of watershed.
- Changing land uses. We can't always predict what needs changing land uses bring or effects on supply and demand for water. Bozeman is a high growth areas where the competition among uses is likely to be felt early on. We have to be ready to be able to adapt quickly to changing needs/changing allocations of water among beneficial

uses. The current systems are cumbersome at best - DNRC change of use, water banking, instream flows, fracking needs, temporary leasing, exempt wells in closed basins. Needed - better, streamlined procedures that are flexible and fair.

- Wastewater. There is no place for waste water. It is a key part of future water supply. Define it and treat it as such. Discharging of groundwater pumping to lower the water table for development, stormwater drainage, sewage treatment plant discharge, discharge of fracking water - we can't do that anymore. The goal is to keep the water we have in the system as snow, wetland floodplain groundwater or in use as long as possible within the watershed. Retain it filter and reuse it. Plan discharge to benefit other uses within the watershed.

- The basic dilemma - US state government own most of our watershed and control supply. Irrigators own most of the senior water rights. Municipalities believe they should have priority over other use. Industry and commerce tout that they need unlimited water to create jobs. Fish and Game, environmentalist and recreationists demand instream flows to preserve habitat.

- Aim for the ability to adapt to seasonal short and long term climate change supply variations. Remember water is linked to food. Water is linked to energy. Hydropower, small scale hydro, geothermal, biofuel, (algae production tanks), growing camelina or corn for ethanol/jet fuel, fracking water, coal slurry. See diagram of Klundborg, Denmark. Water carries heat for heating and cooling. Water carries sludge for fertilizer. Water can also carry reclaimable chemicals - fracking. Remember water is linked to food. Ag - the process of capturing solar energy by the biological processes of plants and animals. That can be done locally anywhere there is sunshine. Even in urban areas. Large scale ag needs lots of water, but can afford the economies of scale to re=use it as part of a closed system. See diagram from Successful Farming. (Referenced diagrams are provided at end of document.)(Commenter provided personal background information - BS Forestry UofM'68. Rural route mail carrier - Gallatin Valley 1980-2004. watched the housing boom and attendant water problems up close; visioning process, Gallatin Valley Tomorrow - 1 yr - Ag and Env & Economic Devel Committee; rancher, homesteader, irrigator; participated in lots of planning and zoning initiatives since 1989 in Gallatin Valley; Board member AGAI, Great Gallatin Watershed Council; Former Board member READ, Work forst training Inc.; AERO, MT Environmental Education Association.)

- consumptive use/recharge

- analysis of use - irrigation and type of irrigation; historical changes, practices

- Downstream demands - state/federal

- efficiency upgrades - recharge effects

- Historical data and levels - Facts

- Types of aquifers - effects by pumpings (unconfined/confined)

- Foundation of analysis = factual data - current/historical; coordination between agencies

- Water quality from Water use

- Adjudication

- Permitting process examined

- Instream flows - Must be maintained for fish & wildlife
- Water quality - All uses must ensure that water quality is maintained especially in light of oil and gas development.

ASSOCIATED WITH DILLON MEETING

- Storage; both on stream and off stream was a very big topic for a lot of people.
- Creation of a centralized data base where water records could be found easier than what is now available.
- Explore funding possibilities for water storage and rehabilitating existing structures and creating a network to access those funding possibilities.
- Water rights are property rights and should be protected.
- An idea we discussed after the meeting was protection for a water right that was only partially used for irrigation and the rest left in the stream for fish enhancement for many years. The same protection for a mining right that may not be used for many years because of negative economic factors associated with the market for the minerals. These rights should be protected in their entirety.
- Humans are a natural part of the ecosystem, which means that we must include reasonable (equitable historically) resources to the future producers, recreators, and Montanans.
- We need a management plan for our forests.
- Do more research on the effects of more efficient irrigation practices. It doesn't make sense that producers use 1/2 water rights, produce more yield, but are hurting the water supply?
- Maintain state and local control as much as possible throughout planning. Take more control of Clark Canyon Dam (*versus?*) more control with Corps of Engineers.
- Streamline adjudication process - set timelines - Increase earmarked funding with audits - Make litigants and lawyers accountable to meet deadlines - get tough.
- Offstream storage - surface - Explore old and new groundwater storage areas - Augment groundwater with offseason flows
- Downstream states demand drawing water out of Montana
- Water budget and vegetative management - Forest health - timber management.
- Ethical issues concerning issues of water banking i.e., influence, lobbying, etc. Precedent-setting without statewide public comment.
- Period of use needs flexibility to deal with potential climate change issues.
- Groundwater storage through hybrid irrigation systems - high mountain (*pico?*) storage through improvements to existing small dams.

- Protection from eminent domain and ESA
- The adjudication process should not allow non water right holders a place at the table
- Not to tax water right holders by their water right (cfs of by right #)
- use of ESA to force change or water use and place of use.
- Storage of water should be considered at all times (off-season storage)

ADDITIONAL INPUT SUBMITTED DURING PUBLIC MEETING PHASE (NOT ASSOCIATED WITH MEETINGS)

- The State Water Plan should include consideration of the nexus between water quantity and quality... the MWSI should create a needed data clearinghouse so as to better inform water quantity decision-making... The statute required a "comprehensive inventory" of water resources, which should water quantity and quality..., including an inventory of water quality issues, particularly those whose acuteness is inherently tied to water quantity. At least eleven sub-watersheds within the Upper Missouri Basin have at least one TMDLs, meaning they fail to support their designated uses. The majority concern excessive loading of nutrients, sediment, and or temperature problems. ... Sedimentation and high temperatures in waterways are interrelated with water quantity concerns. There is readily available data on both water quantity and quality... The plan should not provide Montanans with available water, but waters that are fishable, swimmable, drinkable (see full 3-page letter for detail)
- Ban fracking. We can live without fracking but we cannot live without water. Fracking requires huge amounts of water for its operation and returns a terribly polluted product back to the ground when it is done. The small amounts of fuel to be had with this method are nothing compared to the damage and expense of land, water, and health repair needed to offset the problem, if that is even possible.
- Cap population growth or require xeriscaping in new developments. Rampant growth is what every cancer cell loves. Is that our model? We need to apply wisdom for our future plan, not short sighted fear. Let us be leaders in future planning, not banging our heads on the same things that are not working anymore.
- Finally, only when we preserve every bit of wilderness and natural balance that we can will we have the health and wholeness of our families, air , land, and water to have anything to plan about in our future.
- Water adjudication and basin closures appear to only consider surface flows and rights... We seem to arbitrarily separate surface water from ground water for solving some issues or regulating some uses, while in other cases we connect surface water and groundwater when more convenient. ...All water, both surface and ground, is connected and the state water plan must include both in the analysis of water quantity and availability. (see full letter for detail)
- We are well below over-(appropriation). Water reserves have been discussed in both above ground and underground storage. The use of flood irrigation has a clear benefit to groundwater storage and has been considered an option in many places in Montana to mitigate municipal and surface water usage. (see letter for detail)

- Any initiative involving natural resources should give due attention to conservation and efficient use. It is especially critical as the human population continues to increase. And, wise use of water is directly and indirectly linked to energy use.

- Because most water use in Montana is for agriculture, there should be educational efforts to educate producers on the numerous ways they can use water more wisely. This includes using the most efficient irrigation equipment available and considering crops that can grow on what rain we receive in this semi-arid state and/or crops that require the least amount of irrigation. The USDA and other federal entities have resources, but I could not provide links as the websites are down due to the furlough. This link lists resources: <http://waterquality.montana.edu/docs/Region8/AgricultureWater.shtml>

- Urban water users have numerous opportunities for improvement as well. My neighbor waters his lawn every day, but complains when there are low river levels and restrictions to fishing. My Homeowner's Association used to water our common areas at noon during July, but after I spoke up about how this wastes up to 30% of the water due to evaporation, they changed the watering time. I used to work as a water conservation specialist for a city in Colorado that had junior water rights, and we had water "restrictions." What's interesting is that we simply required people only use what was actually needed for their lawns. There are universally accepted Best Management Practices (BMPs) for outdoor and indoor water use that include no- and low-cost measures for wise water use.

- Using water wisely takes not only an educated and informed public, but an infrastructure (services and equipment) to support folks who want to use water wisely. At a minimum, local water suppliers/utilities should provide access to information on how to use water more wisely. Simple strategies could include listing a tip a month on water bills, listing BMP's on websites or posters for public bulletin boards, etc.

Resource links:

1. The U.S. Environmental Protection Agency's WaterSense website: <http://www.epa.gov/watersense/>
2. U.S. DOE's Office of Energy Efficiency & Renewable Energy: http://www1.eere.energy.gov/femp/program/waterefficiency_bmp.html
3. *Greater Yellowstone Area Xeriscaping: A Guide for Landscaping with Less Water*. I have the document as a PDF, but it's large so I will not send to you unless you ask. For a hard copy or to be sent a link (if there is one) contact Virginia Kelly, GYCC Executive Coordinator at Phone: 406-587-6704; E-mail: vkelly@fs.fed.us
4. I cannot attend the Bozeman water meeting because I will be attending the Net Zero Energy Leadership Summit in Irvine, CA. Attendees have been asked to read about Collective Impact. Such a collaboration that included representatives from all user groups that value water and water quality would be worthy of your consideration: <http://www.netzeroenergysummit.com/collective-impact>

- (*Paraphrased from e-mail and phone input*) Michigan underwent a state planning process that bogged down somewhat until they defined their decision space. They identified a list of Guiding Principles that they could all stand by and then planning went much more smoothly after that. Although Michigan is different than Montana (as is evidenced by the first Principle), the process could be a good idea for Montana's state water planning. One way to generate a list of agreed-upon principles is to go around the room asking each person to propose a principle. For each proposed principle: If anyone totally disagrees, then they say so and explain why, and then we let it go. If anyone disagrees as proposed, but feels they could agree if it were worded or nuanced differently, then we all work together to find common language for that principle. The first draft might be a list of long, convoluted

principles. Then someone wordsmiths it to make it clear and concise, and then the group reviews it, repeat until everyone stands by it. Then it becomes the guidepost that delineates our decision space for state water planning. This was also the model for the Brisbane Declaration on Environmental Flows. The first draft was a zillion pages long. I edited it down to 5 pages. 60 people commented. They all said “add this and make it shorter.” The final draft is 2 pages long and has been cited hundreds of times.

Below are Michigan's draft Principles:

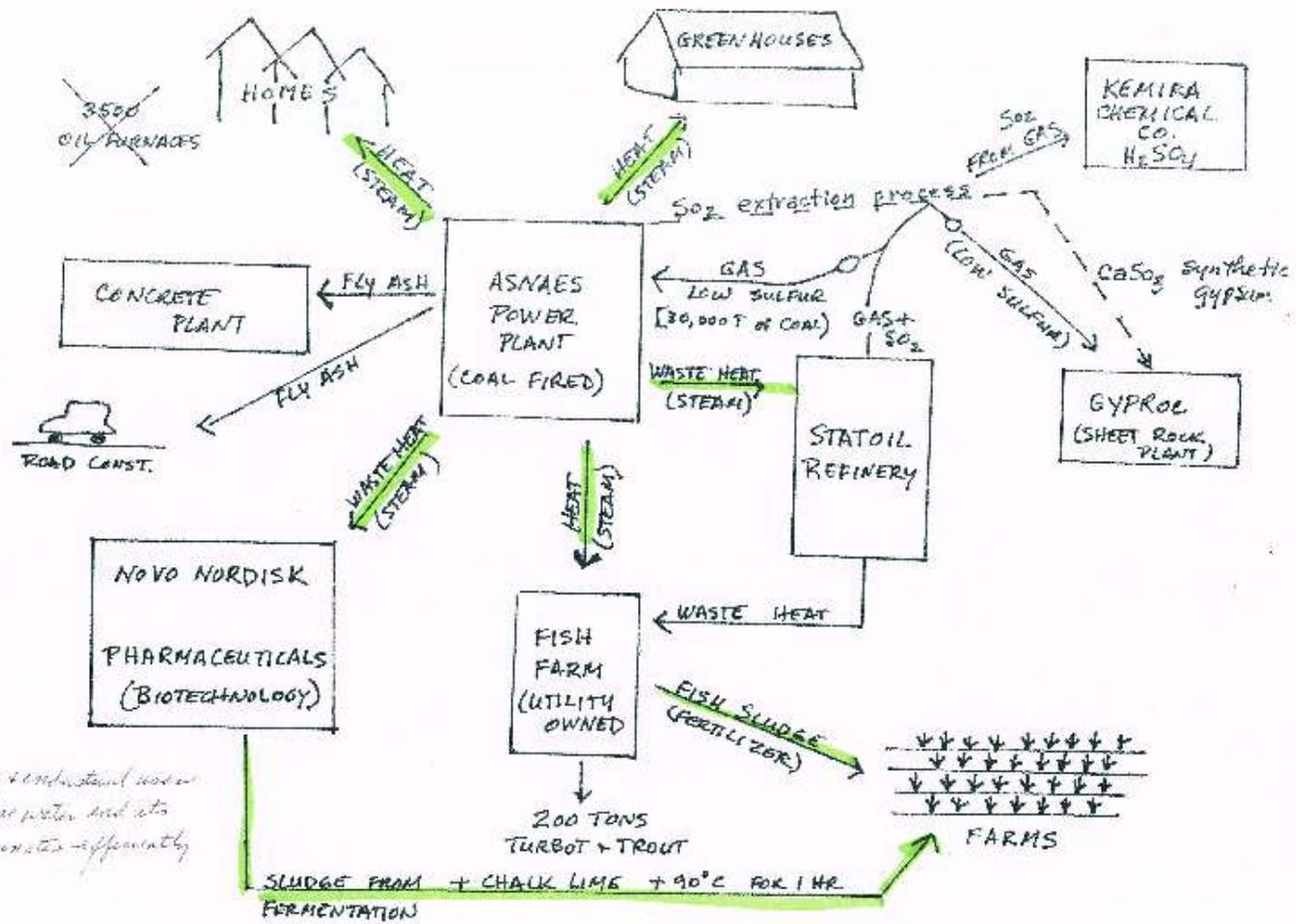
Michigan Guiding Principles

March 20, 2007 draft

1. Michigan has an abundance of water resources. There is no overall shortage of water in the State. Currently, water withdrawals in Michigan do not present a crisis.
2. Not all water withdrawals are alike, and have differing levels and types of impacts. Certain water sources can support a large amount of withdrawal without harm to other users or to the ecosystem. Other water sources are more vulnerable to large withdrawals.
3. Some areas of the state have been identified as sensitive to groundwater withdrawals. Current and future withdrawals in these areas require a higher degree of monitoring, scientific research, and understanding.
4. Water is a valuable asset, and if used efficiently, can provide the basis of a strong economy and high quality of life in Michigan.
5. Ground and surface water are strongly interrelated and cannot be viewed as separate and distinct.
6. In order to protect basic ecological function, adequate stream base flow must be maintained.
7. Water use by type of user or by purpose of use is not prioritized.
8. The amount of water withdrawn from a hydrologic system must be sustainable. Water resource sustainability involves the use of scientific analysis to balance the economic, social and environmental demands placed on the resource to ensure that the needs of current and future generations are not compromised by current usage.
9. Indicators of sustainability are important to assessing Michigan's water use.
10. The accuracy and effectiveness of water management is an evolutionary, long-term process that must be continually enhanced with scientific information. Additional monitoring of stream flows, water levels, aquatic ecosystems, and related mapping and analysis is essential to protecting water resources.
11. Any water management process must be consistent with applicable statutory and common law in Michigan, neither abrogating nor expanding the law absent specific legislative action.
12. Consistency of regulation and predictability between state and local units of government are essential to managing the resource.
13. Education is critical for all water users, private and public, to understand their responsibilities for water conservation and efficient use.
14. Local, voluntary problem-solving approaches for resolving water use disputes and withdrawal impacts are the desirable starting point for conflict resolution. Michigan has a role in disputes involving impacts on environmentally sensitive areas. Legal action by any party should be seen as the last option.
15. Withdrawals presenting the greatest risk of causing an adverse impact to natural resources should be the primary focus of a water management process.
16. Information gathered and provided for the purpose of preliminary evaluation of water withdrawal projects must be simple and understandable in the most accurate and represented manner possible.
17. Mitigation of adverse resource impacts is a reasonable alternative for new and expanding water withdrawals where deemed appropriate.
18. Conservation of water resources includes the efficient use and protection of quality.
19. Preliminary evaluation of potential adverse resource impacts on fish populations and other existing water users caused by new water withdrawal must have value to new and existing water users, is

important prior to significant economic investment and is critical to determining the need for further analysis.

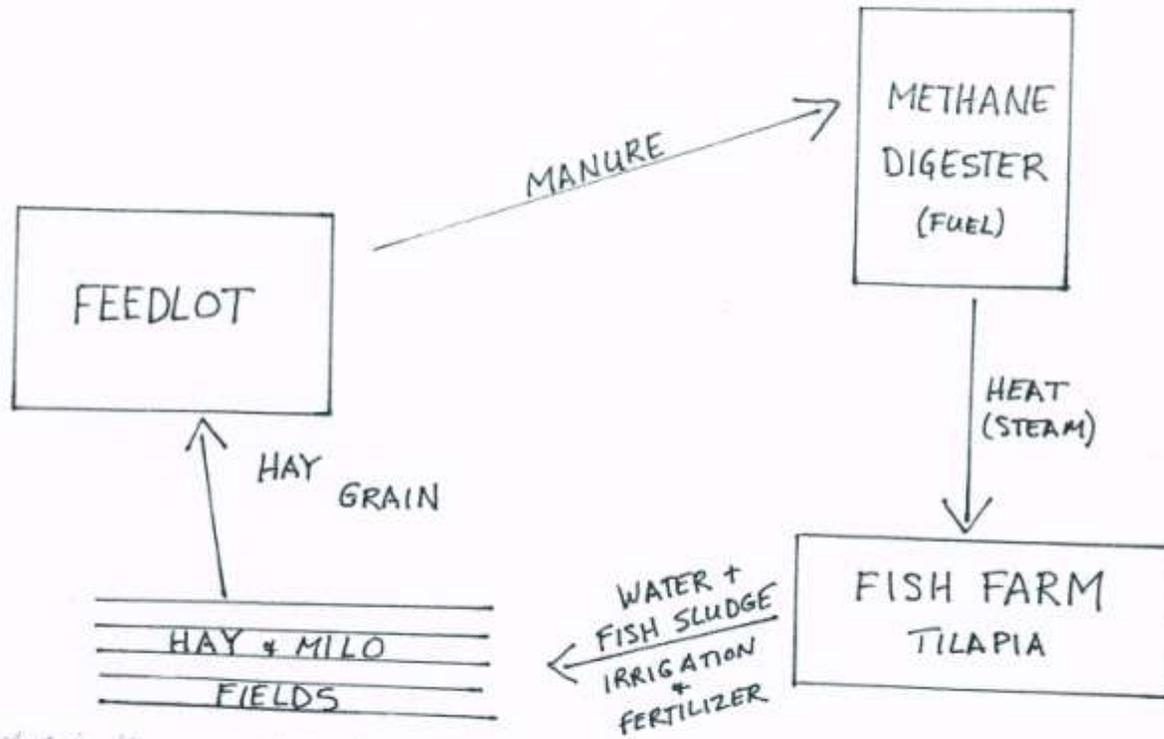
20. The goals of a water use assessment tool are to provide a better understanding of withdrawal impacts, to minimize water use conflicts, to facilitate water planning among stakeholders, and to assess long-term conservation strategies.



KALUNDBORG, DENMARK

HAWKIN, ECOLOGY OF CONNEXE P. 62-63.

FEEDLOT SOUTHWEST KANSAS



Large scale agriculture can afford the economies of scale to re-use water within a closed system. Why not, shouldn't we offer incentives for that?

FROM SUCCESSFULL FARMING 1992

