National Ground-Water Monitoring Network
Montana Update

A National Framework for Ground-Water Monitoring in the United States
Prepared by The Subcommittee on Ground Water of The Advisory Committee on Water Information
Approved by The Advisory Committee on Water Information

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Results of the Montana Pilot Study for the National Ground
Water Monitoring Network

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Outline
- History
- Wells and GW use
- Principal aquifers
- MT network and database
- NGWMN selection
- Trans boundary/ Management applications

John LaFave
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Presented to SOGW 12/6/16
National Ground-Water Monitoring Network

Montana Update

Water wells in Montana

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Presented to SOGW 12/6/16
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Montana wells and Geology

Water wells in Montana
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Montana Principal Aquifers (7)
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Montana Principal Aquifers

- Ft. Union
- Hell Ck
- Fox Hills
- Judith Rv
- Eagle SS
- Kootenai
- Madison

Sand and gravel glacial aquifers

Glacial extent

Alluvial aquifers
Established 1991 – GW Assessment Act
~ 1,000 wells, measured quarterly, ~100 dataloggers
Funding – Steering Committee - COOP
Online database - mapper
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Montana Ground Water Information Center

http://mbmggwic.mtech.edu/

Other Data:
- Well Logs
- Water Quality
- Hydrographs
- Maps & Repts
- Project data

Online mapper
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NGWMN Selection

1) Completed in a Principal Aquifer?

2) 5 yrs of data at regular frequency?

3) Spatial distribution
   - Vertical/horizontal
   - Sub aquifer - UPCTCS
   - Flow system position
   - Adjacent land/water use
   - Hydrograph

Identification of wells appropriate for the NGWMN

Baseline Process (5 Years)

Evaluation and subnetwork determination

856 wells

No anthropogenic effects
Subnetwork for Background Conditions

Suspected Changes
Subnetwork for Suspected Changes

Documented Changes
Subnetwork for Documented Changes

192
Subnetwork for Background Conditions

5
Subnetwork for Suspected Changes

30
Subnetwork for Documented Changes

Surveillance Monitoring Wells
Trend Monitoring Wells
Surveillance Monitoring Wells
Trend Monitoring Wells
Surveillance Monitoring Wells
Trend Monitoring Wells

Backbone Wells
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WL: NGWMN Selection – 227 wells

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<th>Background</th>
<th>Suspected Change</th>
<th>Documented Change</th>
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WQ: NGWMN Selection – 58 wells

Surveillance

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Helena

S100NRMTIB
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NGWMN ‘Background’
National Ground-Water Monitoring Network

NGWMN ‘Documented Changes’

Seasonal pumping
Irrigation recharge
Depletion

S100NRMTIB
S100NRMTIB
N300UPCTCS
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Network Application - Transboundary issues

three states – four Canadian provinces

Issues: GW development – coal and CBM development
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Network Application - Transboundary issues

Issues:  1) unrestricted flowing wells
        2) industrial GW development
Is groundwater development depleting the Madison aquifer near Great Falls?
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Network Application - Management question

1995 - 2005
Wells ~ doubled

Development impacts?
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Network Application - Management question

1995 - 2005
Wells ~ doubled
WL’s ↓ 30 ft

Development IMPACTS!
Development not controlling water levels
Since 2005 water levels recovered 30+ feet
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Network Application - Management question

Climate (precipitation) controls water levels

2014

MBMG-2394

Precipitation: departure from yearly average near Great Falls, MT

Dry

Wet

MBMG-2394

Water level elevation (ft ams) Madison Aquifer

number of Madison aquifer wells

number of wells - Water level 2315 - Water Level 2247 - Water Level 2394

Depth to water: feet below land surface

Month/Year
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Network Application - Management question

Climate & Groundwater levels

July–September 2016: departures from average

Moderately dry
Near average
Helena
Near average
Moderately wet
Near average

Departure in feet

- >-20
- >-10
- >-5
- >-1
- Between -1 and +1
- >+1
- >+5
- >+10
- >+20

N

Monterey Bureau of Mines and Geology (MBMG)
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Montana Update - Current NGWMN Projects:

- Provide Well Registry updates and ongoing web services
- obtain survey grade GPS locations and land-surface altitudes
- install protective steel surface casing around PVC-cased wells

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