

Integrated Approach to Flood Management



What programs assist with flood management?

DNR Waters staff provide year-round assistance to local units of government to ensure new development is not at risk of flooding. Area hydrologists also assist land-owners by providing them with information on flood elevations and responding to general floodplain inquiries. The division also has a grant program to mitigate properties that were built in flood prone areas. Assistance includes information, training, and guidance concerning flood insurance, damage determinations, and flood clean-up.

Area Hydrologists provide local officials with technical (floodplain, general hydrology) information in planning for the floods. They provide onsite information to flood forecasters before and during the flood and document maximum crest levels for the flood event. After the flood, area hydrologists handle permits needed for repair of flood damage in public waters. They provide information to local officials concerning the determination of substantially damaged structures.

Stream Monitoring Unit provides stream flow data to forecasters before and during the flood. They help document peak water levels, peak flows, and provide technical analysis to predict future flooding. They also collect and interpret stream data from the statewide network of stream gages.

Climatology Unit coordinates with flood forecasters on climate conditions existing before a flood and evaluate those conditions in historical context. After a flood, they provide disaster relief officials with a summary of climate conditions leading to the disaster.



DNR Waters seeks to break the cycle of flood damage and repair

The ravages of flooding can have devastating effects on people's lives and their communities. DNR Waters provides an integrated approach to flood management for communities. This involves year-round monitoring, data collection, training, financial assistance, and setting standards for floodplain protection. This proactive approach is proven to be cost effective and empowers local communities facing flood issues to better manage their flood risk.

Flood Studies and Mapping

As we gather more years of hydrologic data in more places throughout the state, community flood studies and maps are being updated. The newest maps use GIS and incorporate LiDAR data (high quality topographic mapping) as it becomes available. GIS maps can be viewed on computers and placed on top of aerial maps along with property lines or other data making it very easy for community planners to see whether a property is in the floodplain.



Before a flood...
DNR assists local units of government during public meetings with FEMA about preliminary floodplain maps.

Community Assistance

A DNR community assistance hydrologist and DNR Area Hydrologists located in communities around the state assist community planners and zoning officials in interpreting floodplain studies, maps, and state and federal flood regulations. DNR Hydrologists help in updating the studies, maps, and community floodplain ordinances. They also look for opportunities to reduce damages from future floods. Communities that administer FEMA floodplain regulations are eligible to participate in the National Flood Insurance Program (NFIP). The DNR assists communities with NFIP enrollment and helps them adopt local floodplain management regulations to meet both state and FEMA requirements. The Flood Hazard Mitigation Grant Assistance Program provides up to 50% funding for projects that mitigate flood damages and eliminate repeated losses from flooding. Small grants are made directly from the DNR.

Grants with state share exceeding \$150,000 are presented to the governor and the legislature for consideration in a capital bonding bill. Grant applications are received and prioritized by the DNR. The projects eligible for the grants include the following:

- acquisition and removal of flood-prone structures
- levees, ring dikes, and flood walls
- flood warning systems
- public education workshops
- flood insurance studies
- floodplain mapping
- floodplain and river restorations and
- cost share on federal projects



During a flood...
DNR collects onsite data critical to monitoring the discharge (velocity and volume) and height level of a river.

LEFT: DNR hydrologist checks flooded roadway to determine whether it is safe to collect data from the bridge in the distance.

RIGHT: Hydrologists draw an orange Acoustic Doppler Current Profiler across the swollen Wild Rice River north of Moorhead to establish stream depth and discharge.



measuring flow off of a bridge

Integrated Approach to Flood Management

Flood mitigation projects in East Grand Forks, Breckenridge, Crookston, Granite Falls and other communities across the state have significantly reduced the risk of flood loss. It is estimated that for every dollar invested in mitigation, \$4 in future damage is prevented.

FEMA, 2009



After a flood...

DNR assists local units of government by assessing flood damage and collecting and analyzing the magnitude of the flood. This data provides historical perspective, helps refine flood forecast models, and can be used in updates to flood studies and flood maps.

These photos from the 2007 flood in southeast Minnesota show the structures affected by bank erosion (above) and a home moved off its foundation by floodwater (left).

Data Collection and Interpretation

The Stream Hydrology Unit and State Climatology Office are active all year collecting lake and stream data and climatology data to support forecasting and planning efforts. The staff works with other agencies, such as the U.S. Army Corps of Engineers, U.S. Geological Survey, the MN Department of Public Safety, Homeland Security and Emergency Management and the National Weather Service, to interpret that data. By providing data throughout the year, DNR can assist in recognizing the conditions that may lead to flooding before it occurs. During a flood event, DNR staff provide current and critical data on stream levels. After a flood, the staff work with local, state, and federal agencies to assess any damages. During floods with a long duration, several stream measurements may be taken to revise the flood forecast and forecasted flood peak(s). In 2009, 53 discharge measurements were taken, 18 of which were made at gages located on tributaries to the Red River over the seven-day period. This information is critical in building emergency levees, closing roads or evacuating neighborhoods.

Hydrologists provide a range of products and services used by staffs at local, state, and federal agencies:

- data interpretation of streamflow conditions based on data from more than 70 gages
- daily reports of streamflow conditions during flood events

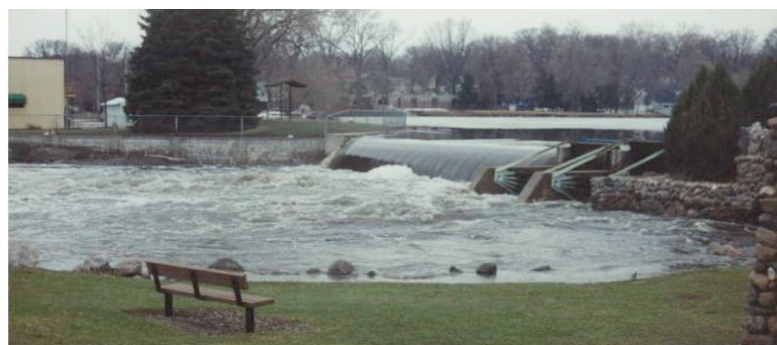


The hydrologist checks and saves discharge data on this stream.



DNR hydrologist prepares to collect stream flow data with the orange Acoustic Doppler Profiler.

Data collection all year: Federal, state, and local agencies depend on DNR's data collection on rivers and streams across the state.



Statewide assessment of dams is important to ensure that dams are safe and will function as designed to reduce downstream flooding, thus protecting lives and property.

DNR Contact Information



DNR Waters website and a listing of Area Hydrologists: <http://mndnr.gov/waters>

DNR Waters in St. Paul:
500 Lafayette Road, Box 32
St. Paul, MN 55155
(651) 259-5700

This information is available in an alternative format on request.

© 2010 State of Minnesota, Department of Natural Resources

DNR Information Center

Twin Cities: (651) 296-6157
Minnesota toll free: 1-888-646-6367
Telecommunication device for the deaf (TDD): (651) 296-5484
TDD toll free: 1-800-657-3929

Equal opportunity to participate in and benefit from programs of the Minnesota Department of Natural Resources is available regardless of race, color, national origin, sex, sexual orientation, marital status, status with regard to public assistance, age, or disability. Discrimination inquiries should be sent to Minnesota DNR, 500 Lafayette Road, St. Paul, MN 55155-4049; or the Equal Opportunity Office, Department of the Interior, Washington, DC 20240.