

**GOVERNMENT FOLLOW-UP
ON
INTERNATIONAL JOINT COMMISSION'S
RECOMMENDATIONS FROM THE 1997 INTERIM REPORT
RED RIVER FLOODING: SHORT-TERM MEASURES**

April 2000

Following the devastating floods of 1997 in the Red River basin, the governments of Canada and the United States asked the International Joint Commission (IJC) to investigate the causes and effects of flooding in the basin and to provide them with an interim report by the end of 1997.

On December 31, 1997, the International Joint Commission reported to the governments of Canada and the United States on interim measures that should be undertaken to prepare for possible floods in the short-term. The interim report cautioned against complacency, noted that major flooding could occur at any time, and made 40 recommendations regarding flood forecasting, monitoring improvements, emergency measures and planning, environmental concerns, and floodplain management including zoning, legislation, and enforcement.

The IJC asked its International Red River Basin Task Force to report on governments' actions in areas covered by the 40 recommendations. The Task Force reported in July 1998 and in April 1999. The report has been updated and the results of the Task Force's inquiries are summarized in the attached table. Although the recommendations were directed primarily towards federal, state, and provincial governments, the Task Force also notes in the table, areas where it has taken action.

The different jurisdictions report action on almost all of the areas where the IJC made recommendations.

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| Future Floods | |
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| 1. Alert the public in the Red River basin to the reality that while the 1997 flood had a return interval ranging from 100 to 500 years, depending on the location, there is a statistical probability of a similar flood each year. Flood preparedness must be part of the culture of the Red River valley. Put simply, the flood of 1997 or an even larger one could happen any year. | |
| United States | <ul style="list-style-type: none"> ❑ In the evaluation of short- and long-term flood damage reduction measures with communities, the Army Corps of Engineers stresses the remaining risk, even after the measures have been implemented. ❑ FEMA has funded a Regional Project Impact initiative in the Red River basin to enhance public awareness in the Red River basin. In addition, FEMA has a marketing campaign to increase public awareness of flooding and to increase the purchase of flood insurance policies in the region. |
| Minnesota | Three flood related brochures were prepared and distributed. Project WET (Water Education for Teachers) has been enhanced and expanded. Dept. of Commerce is developing a recap of the processes and products of the 1997 flood recovery. |
| North Dakota | The state is continuing with education, press releases and articles. |
| Canada | <ul style="list-style-type: none"> ❑ To increase awareness about emergencies, Emergency Preparedness Canada provides a comprehensive program of public information related to emergency preparedness. A series of self-help advice on what to do before, during, and after an emergency, available in print and through the Internet, is the focus of the "Emergency Preparedness Week" held annually in cooperation with provincial emergency measures organizations during the first week of May. These public information tools are used to heighten public awareness about various types of potential disasters, including floods. ❑ The EPC web site will contain flood analyses and assessment of key flood damage reduction strategies in the Red River Basin that were commissioned in cooperation with the Environmental Adaptations Group of Environment Canada. ❑ Environment Canada is involved in "Project WET." Environment Canada's web site "Green Lane" provides Internet links to flood information including the Flood Damage Reduction Program. |
| Manitoba | The public is continuing to be alerted about the threat of major floods--even beyond the 1997 flood level. Manitoba Water Resources has improved the distribution of forecast reports by increased use of facsimiles, e-mail and the Internet. Flood information is also provided on Water Resources' home page: http://www.gov.mb.ca/natres/watres/wrb_main.html . |
| Flood Policy Review | |
| 2. A meeting of senior federal-provincial and federal-state officials in each country should be convened to undertake policy level discussions and an examination of the 1997 flood. Special attention would be placed on extending the positive aspects of flood preparation and management during 1997 to future events throughout the Red River valley. | |
| United States | FEMA and several other federal agencies, state, and local communities met to discuss long-range recovery issues, which included coordination with the states on preparedness and mitigation. The final report of the President's Long-term Recovery Task Force was published in December 1997. |
| Minnesota | Dept. of Public Safety/Dept. of Natural Resources - Div. of Emergency Management to coordinating state involvement. |
| North Dakota | The Red River International Flood Mitigation Initiative, coordinated by the North Dakota Consensus Council, was formed to undertake policy level discussions on issues related Red River flooding. The Initiative includes representatives from North Dakota, Minnesota and Manitoba, including state and federal government officials and representatives from the Task Force. |
| Canada | The annual meeting of the Canada/USA Consultative Group on Civil Emergency Planning will be held in June of 1999. Implementation of the Red River Task Force recommendations pertaining to emergency management will be on the agenda of this meeting. |
| Manitoba | The Department of Conservation (formerly Natural Resources) is awaiting the results of the Task Force's work in this area as well as the results of the International Flood Mitigation Initiative before organizing a forum. |

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| 3. Increased liaison on a regular basis among the emergency management organizations throughout the basin should be a priority in order to establish better appreciation for the manner in which each operates during an emergency. | |
| United States | <ul style="list-style-type: none"> ❑ The Prairie Emergency Management Advisory Committee (PREMAC), which includes emergency management personnel at the federal and state/provincial level from North Dakota, Montana, Minnesota, Saskatchewan, and Manitoba, met Dec 17-18, 1998 in Denver, Colorado. Cross-border liaison and coordination issues were discussed and it was agreed to hold a more in-depth discussion at the next meeting in Bismarck, North Dakota, on May 4-5, 1999. ❑ Army Corps of Engineers meets annually with the National Weather Service and other emergency management organizations, including Minnesota Emergency Management and Dept. of Natural Resources prior to the spring runoff. ❑ Manitoba federal officials of the Federal Emergency Planning Coordination Committee (FEPCC) have reviewed Task Force recommendations for possible roles/activities of their departments or agencies and for possible coordinated roles/activities by the FEPCC. ❑ Environment Canada is a member of the Manitoba Emergency Measures Organization (MEMO), Interagency Emergency Preparedness Committee (IEPC). A flood preparedness and awareness session was held in Morris, Manitoba and similar sessions are expected to be held in future years as required. |
| Minnesota | |
| North Dakota | |
| Canada | |
| Manitoba | |
| 4. During a flood, Canadian liaison officers should be present in U.S. flood emergency centers to immediately relay information to Manitoba. | |
| Manitoba | This would be considered if a flood greater than 1997 is anticipated. |

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| Flood Forecasting | |
| 5. Update and enhance existing forecast models based on 1997 data and experience, focusing specifically on improvements that can be incorporated in basin-wide forecasts prior to the 1998 season. In particular, rating curve extensions should be undertaken as soon as possible. | |
| United States | Rating curves have been updated and extended using 1997 data. |
| Canada | Environment Canada has completed rating curve extensions. |
| Manitoba | Manitoba Water Resources has completed its work in updating all flood forecasting procedures and is now using a new hydrodynamic model developed under the direction of the Task Force. |
| 6. Monitor the potential effects of El Nino on 1998 weather. | |
| | Complete |
| 7. All flood-forecasting agencies should ensure that they have sufficient, experienced flood forecasting staff at all times. | |
| United States | U.S. Weather Service places high priority on having experienced flood-forecasting staff. |
| Minnesota | The Department of Natural Resources has coordinated contacts with data collection specialists from the USGS, USACOE, NWS, and DNR for purposes of enhancing the amount of data gathering in the field during high flow conditions. The National Weather Service is staffed 24 hours a day during flood events. |
| North Dakota | |
| Canada | Under established arrangements with Manitoba Natural Resources, Environment Canada continues to provide hydrometric data to the province's forecast centre. |
| Manitoba | Manitoba Water Resources has added two staff persons to its river forecast center and one staff person in hydrologic support for flood management. |

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| Flood Forecasts for the Public | |
| 8. Simplify and clarify communication between flood forecasters and those with local flood emergency responsibility, throughout the basin. The dissemination of forecast information to the public through the media should be simple and the variables inherent in those forecasts easily understood. | |
| United States | Discussions have been held among federal agencies on how to enhance flood-forecasting communications. |
| Minnesota | Several meetings have been held to enhance relationship between the National Weather Service, Div. of Emergency Management, and Dept. of Natural Resources. |
| North Dakota | The Division of Emergency Management posts flood forecast information and situation reports on the Internet, www.state.nd.us/dem . |
| Canada | Environment Canada provides weather forecasts serving flood preparedness and forecasting in the basin |
| Manitoba | Efforts to enhance public understanding of forecast ranges include using simpler terms like 'unfavourable' rather than 'upper decile'. The information used to formulate forecasts is explained in narrative form and an explanation of forecasts for three weather scenarios (favourable, average and unfavourable) is included in outlook reports. Communications systems and methods are continuing to evolve in consultation with residents and flood fighters. A survey of information users has also been carried out. |

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| Floodplain Management | |
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| 9. The Province of Manitoba, and affected municipalities, should review all Designated Flood Area legislation and zoning provisions with the intent of widening the options for enforcement. A comprehensive program of early inspection and enforcement should be developed and implemented immediately. Once this program is implemented, non-compliant new structures should not be eligible for disaster assistance. | |
| Manitoba | <p>Designated flood area legislation has been revised. The changes will:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Allow for early inspections (after new foundation or footings are complete); <input type="checkbox"/> Stipulate penalties for non-compliance including fines, stop work orders and ineligibility for future flood damage or disaster assistance; and <input type="checkbox"/> Enable the government to place a notice against the title advising that the structure does not comply with floodproofing criteria and is, therefore, ineligible for flood damage assistance. <p>The Department of Intergovernmental Affairs (formerly Rural Development) is continuing to review land use planning bylaws and development control/enforcement capabilities with municipalities and is preparing an enhanced strategy. It is anticipated that the overall review by Manitoba, Community Economic Development Services, should be completed by summer 2000. Several municipalities have adopted flood elevation standards consistent with new Water Resources Branch guidelines and are requiring that these standards are met in the issuance of building permits.</p> |
| 10. In the United States, more stringent adherence to existing policies is a necessary, immediate and effective first step for better floodplain management. Emphasis should be placed on increasing participation in the flood insurance program. | |
| United States | <ul style="list-style-type: none"> <input type="checkbox"/> FEMA is working with the state and local agencies to gain a higher level of emphasis in these areas. <input type="checkbox"/> Nearly all flood-prone communities in the Red River Basin are participating in the National Flood Insurance Program (NFIP). FEMA administers the NFIP and has an active Community Compliance effort at the national and regional level with assistance from the States. Through the NFIP Community Assistance Program funding is provided to the States to undertake compliance activities with participating communities. The NFIP Community Rating System rewards communities with active floodplain management programs with reductions in flood insurance premiums. A prerequisite for participation is compliance with the NFIP. An effort is currently underway to examine new and innovative ways of enhancing NFIP community compliance nationwide. |
| Minnesota | <p>Flood Insurance Report prepared.</p> <p>August 97 MN legislature passed a law to require a higher level of protection (freeboard) for new buildings.</p> |
| North Dakota | <p>Legislation was passed in 1999 that strengthens the state's floodplain management laws. Key provisions of the legislation include: (1) requires communities prone to flooding, as determined by the state engineer, to be in the flood insurance program; (2) requires county subdivision plans to show identified 100-year floodplain boundaries; and (3) encourages communities to adapt freeboard standards that require structures to be constructed one-foot above the base 100-year flood elevation.</p> |
| 11. Update profiles, maps and flood frequency curves for the Red River basin. | |
| United States | <ul style="list-style-type: none"> <input type="checkbox"/> Funding has been provided through FEMA and the Army Corps of Engineers Floodplain Management Services Program has been used to update the Red River main stem hydrology. <input type="checkbox"/> FEMA coordinated an interagency agreement with the St. Paul District of the Corps of Engineers a flood study of the Red River Basin for the National Flood Insurance Program. |
| Minnesota | |
| North Dakota | <p>The National Weather Service, Corps, Federal Emergency Management Agency (FEMA), State Water Commission and others have held meetings in Fargo and Grand Forks to discuss technical issues related to Red River hydrology and hydraulics.</p> |
| Canada | <p>Environment Canada has funded profiles of some CNR and CPR railway lines in the basin and delineation of the 1997 flood..</p> |
| Manitoba | <p>Water Resources has updated river profiles, flooded area maps and flood frequency curves. The assistance provided by the Task Force's consultant was valuable.</p> |
| Task Force | <p>To be pursued in Task Force research.</p> |

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| Structural Measures | |
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| 12. Plans to implement new flood mitigation and flood-proofing measures for individuals and communities – if sound in economic, environmental, engineering and social terms – should continue as rapidly as possible. All such measures, whether by government or individuals, should be coordinated and examined to determine possible damage to others within the basin. | |
| United States | <ul style="list-style-type: none"> ❑ The Army Corps of Engineers is part of a multi-agency task force to review funding requests for post-flood measures. The Corps has visited many communities and provided technical assistance for the short term measures and has initiated studies for long term measures at a number of communities. ❑ FEMA in cooperation with the States has implemented through Section 404 of the Stafford Act projects that cover a broad range of mitigation activities in Basin communities. These projects include the acquisition, relocation, and retrofitting of flood-prone buildings in a number of the communities. A requirement for Section 404 funding is a state hazard mitigation plan. Efforts are underway to provide technical assistance and support the development of comprehensive mitigation plans at the local community level. |
| Minnesota | \$17 million in state funding in 1997 has been spent on specific flood mitigation efforts. 1998 legislature appropriated \$30 million to continue efforts and \$1.5 million for studies and mapping. |
| North Dakota | Major flood-proofing and mitigation projects are underway. Grand Forks and East Grand Forks have a major effort underway. Fargo also has a major effort involving acquisition and diking. Flood control projects are also under consideration in Wahpeton and Grafton. The state has approved cost share funding for projects at Grand Forks, Wahpeton, and Grafton. |
| Canada Manitoba | <ul style="list-style-type: none"> ❑ In July 1997, the federal government committed \$12 million and the province \$46 million for a structural improvements and works program. A \$6 million federal-provincial flood proofing and study program was announced in July 1998. ❑ On April 9, 1999, Canada and Manitoba signed a Phase 2, partnership agreement amounting to \$100 million, shared equally. The funds are being used for continued flood mitigation and flood proofing initiatives for individuals, businesses, communities; the environment; database development; and program management support. ❑ Respecting the individual home/business program component--of approximately 2200 eligible applications, almost 1500 projects have been completed or are nearing completion. The expenditure to date is approximately \$57 million. It is estimated that \$75 million will be required to complete this program component. ❑ Thirteen community diking projects totaling approximately \$40 million are to be completed by March 31, 2003. Feasibility and design work is essentially complete with extensive construction activity expected to begin in 2000/2001. Construction of a ring dike at Ste. Agathe is underway. ❑ Canada and Manitoba are planning to negotiate a Phase 3 agreement to address remaining flood proofing issues primarily related to upgrading of Manitoba's major flood control works. |
| Task Force | Task Force's hydraulic models will assist in the assessment of project effects. |
| Coordination | |
| 13. Pursue agreement between the United States and Canada to enable comprehensive civil emergency planning and management that takes into account current trade agreements between the two countries, and in particular, allows for the cross-border transfer of supplies, equipment, contracting services and labor in the event of an emergency. The agreement should look into the possibility of developing regionally specific arrangements, including state-provincial protocols. | |
| United States | <ul style="list-style-type: none"> ❑ Secretary of State Albright and Minister Axworthy agreed to task the IJC to develop a framework for a flood emergency agreement for the Red River basin. ❑ Prairie Regional Emergency Management Advisory Committee (PREMAC) is having discussions on the cross-border transfer of goods and services involving federal, state and provincial emergency planning officials ❑ PREMAC members to independently review Task Force recommendations for areas of possible PREMAC involvement. |
| Minnesota | |
| North Dakota | |
| Canada | |
| Manitoba | |
| 14. North Dakota and Minnesota should review emergency measure agreements in the light of the experience of the 1997 flood. | |
| Minnesota | |
| North Dakota | Review of emergency measures is ongoing. |

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| 15. A basin-wide flood forecasting committee patterned on the Souris River Flood Forecasting Liaison Committee should be established for the Red River basin. | |
| United States | It has been agreed that personnel from flood forecast agencies throughout the Red River basin will meet annually to discuss: flood conditions in the basin, flood forecasting procedures being used, common problems, and planned enhancements and/or developments in flood forecasting procedures. The Task Force is recommending terms of reference for the Forecasting Liaison Committee. |
| Canada | |
| Task Force | |
| 16. In the U.S., where regional operations of federal agencies are divided by the Red River, a lead region should be appointed for emergency operations when a flood is forecast. | |
| United States | |

Flood Emergency Plans

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| 17. All flood emergency plans within the basin should be reviewed in the light of the lessons learned during the 1997 flood to prepare more effectively for the next event. | |
| United States | Army Corps of Engineers emphasizes the preparation and updating of flood emergency plans when coordinating with communities through the Corps' technical assistance program. The Corps is reviewing flood preparedness measures. In 1999, with potential for moderate flooding being forecast in the Grand Forks area, the Corps of Engineers has provided technical assistance, as requested, including a hydrologic reconnaissance team in the field to evaluate the flood potential, a geo-technical analysis on the levees in Grand Forks, and evaluation of flood preparedness plans for Grand Forks. |
| Minnesota | Division of Emergency Management will assist local jurisdictions. The Midwest Assistance program is developing flood emergency action plans for local units of government. |
| North Dakota | Dept. of Emergency Management has done a risk assessment on items that need to be accomplished in the short-term. The work was done with local officials in the Red River Valley. Items included are flood insurance, debris management, warning system improvements, and planning procedure. |
| Canada | The Emergency Preparedness Canada (Manitoba region) chaired, Federal Emergency Preparedness Coordination Committee continually reviews regional plans and arrangements. |
| Manitoba | A review of emergency plans and evacuation criteria have been completed. Copies have been forwarded to communities and a copy of the plan has been included as an appendix in the Manitoba Emergency Plan. In June 1998, the Manitoba Water Commission submitted "An Independent Review of Actions Taken during the 1997 Red River Flood to the Minister of Natural Resources. Recommendations it made regarding flood emergency planning and preparedness have been implemented insofar as possible. |
| 18. Each jurisdiction with responsibilities for evacuation within the basin should establish an evacuation protocol within its emergency operation plan. Particular attention should be given to the clarity and public dissemination of the protocols to help prevent confusion at the time of evacuation. Evacuation plans affect different parts of the population in different ways and plans should take into consideration the specific requirements of vulnerable groups, such as nursing home residents. | |
| United States | Evacuation plans are expected to be part of the flood emergency plans, as discussed in No. 17. |
| Minnesota | Dept. of Public Safety-Div. of Emergency Management will be working with local jurisdictions. |
| North Dakota | The Division of Emergency Management has revised its state emergency operation plan. Local government emergency operation plans are under review by certain jurisdictions. The local plans contain evacuation protocols. |
| Canada | Evacuation is a provincial responsibility and the federal government assists only at the request of the province. |
| Manitoba | Evacuation plans and communication strategies of various departments have been reviewed and modified to become more proactive, accurate, clear and effective. Further reviews and improvements are ongoing. Increased training and education at health care facilities, regional health agencies and municipalities for emergency preparedness is underway using a partnership planning process. |

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| Emergency Communications | |
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| 19. Establish sufficient information centers prior to and during a flood event, through 1-800 hot lines or other well-publicized toll-free telephone numbers, to provide critical information to residents of the flooded area before, during and after the event. Enhance the opportunities for Internet access, particularly for small communities and rural areas. | |
| United States | |
| Minnesota | Dept. of Public Safety-Div. of Emergency Management will establish hotline and joint public info centers. |
| North Dakota | The state maintains a hotline (1-800-472-2121). Information is also available on the Division of Emergency Management's internet homepage (www.state.nd.us/dem) |
| Canada | <ul style="list-style-type: none"> <input type="checkbox"/> Through the Disaster Financial Assistance Arrangement, DFAA, the government of Canada supported the establishment, staffing and maintenance of four provincial flood recovery offices in the Red River Valley. These offices are staffed by provincial, federal and NGO personnel and they provide a "one-stop" information center for flood victims. <input type="checkbox"/> Emergency Preparedness Canada is conducting research and prototyping of new wireless terrestrial and satellite communication technologies for the potential use of Internet technology in Canadian emergency management operations. |
| Manitoba | Departments are continuing to improve information dissemination, such as: <ul style="list-style-type: none"> <input type="checkbox"/> additional, temporary Water Resources flood liaison offices and staff <input type="checkbox"/> updating and augmenting Water Resources' 'flood information' home page <input type="checkbox"/> Emergency Management Organization 1-800 number for citizen inquiries added to emergency plans <input type="checkbox"/> Family Services—Red Cross Memorandum of Understanding completed <input type="checkbox"/> communities being encouraged to establish community internet sites <input type="checkbox"/> health information fact sheets being continued. |

| Human Impacts | |
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| 20. Trauma teams emergency response teams and personal decision-management teams should be maintained until the current demand for services subsides. | |
| United States | |
| Minnesota | Dept. of Public Safety-Div. of Emergency Management will work with local jurisdictions. No funding is available at this time. |
| North Dakota | |
| Canada | Through the Disaster Financial Assistance Arrangements, the Government of Canada supports the augmentation of provincial trauma teams, throughout and well after the flooding. |
| 21. In future times of crisis, such support teams should be established early and begin work as soon as possible. | |
| United States | |
| Minnesota | Dept. of Public Safety-Div. of Emergency Management will work with local jurisdictions. No funding available at this time. |
| North Dakota | The state operates an Emergency Operation Center during times of crisis. Only minor changes were made after the 1997 flood since the center operated effectively. |
| Canada | |
| 22. Information about flooding and the measures in place in case of flooding in the Red River valley should be introduced into the school curriculum throughout the basin, and in particular, in the communities most at risk. | |
| United States | |
| Minnesota | Project WET (water education for teachers) is in place in Minnesota, North Dakota and Manitoba. The K-12 educational materials will be expanded to enhance awareness of flooding and flood preparedness. Emergency preparedness material to be offered through school divisions as well as activity books and resources on psychosocial issues. Appropriate curriculum will be developed. |
| North Dakota | |
| Manitoba | |
| Canada | Environment Canada supports public education through partnerships, such as Project WET. In addition, the cost-shared Canada-Manitoba Agreement on Red River Flood Disaster Assistance has allocated funds to begin the development of a comprehensive geo-science knowledge base that will enhance the understanding of the long-term flood history of the Red River and the geological controls relevant to the Red River flooding. |

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| Canadian Forces | |
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| 23. Earlier notice should be given to the Canadian Forces of their potential involvement in flood fighting in order to allow them additional preparation time. | |
| Canada | Under review by Department of National Defence. |
| 24. Canadian military and civil authorities should reach a common understanding of the types of assistance available, particularly in terms of aid to local law-enforcement authorities. | |
| Canada | Under review by Department of National Defence and Emergency Preparedness Canada. |
| Manitoba | Discussion is ongoing to enable easier access to Department of National Defence assistance for specialized resources, such as Aero Medical aid. |

| Modeling | |
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| 25. Develop hydraulic models for the Red River and its major tributaries, capable of being expanded for use in forecasting and analyzing overland flooding, as well as for floodplain management. | |
| United States | U.S. Geological Survey is prepared a report on on the 1997 flood and the Army Corps of Engineers is updating main stem river profiles using existing hydraulic models and also developed a UNET model (one-dimensional unsteady flow model). |
| Minnesota | The states will be working with the Task Force on the development of hydraulic models. |
| North Dakota | |
| Canada | <ul style="list-style-type: none"> <input type="checkbox"/> Environment Canada has developed a one-dimensional “quick pass” model to assess and identify areas of data deficiency and need for higher resolution data. <input type="checkbox"/> EC is providing technical advice to the University of Manitoba with respect to the investigation of floodway capacity using a 2-dimensional hydrodynamic modeling approach. <input type="checkbox"/> Emergency Preparedness Canada has developed a computer-based natural hazards risk model, NHEMATIS, that will, along with other components, be able to show flood conditions imposed on a landscape or built environment and then calculate damage density and damage costs. |
| Manitoba | <input type="checkbox"/> A hydrodynamic (MIKE 11) hydraulic model was developed under the direction of the Task Force and is now being used operationally in Manitoba. The model has proven to be very useful in: 1) analyzing flow patterns 2) assessing the impacts of proposed changes to major infrastructure in the floodplain and 3) floodplain management. |
| Task Force | Task Force consultants refined a MIKE 11, one-dimensional, unsteady flow hydraulic model of the flood plain from Grand Forks to Selkirk. The model overlaps the Corps UNET model being developed in conjunction with the Task Force, which will model the river from its headwaters to Letellier, Manitoba. |
| 26. Document the 1997 overland flow areas within the basin, high-water marks and head losses, wind effects, timing and extent of road or dike breaches and blow-outs, and data networks used during the flood. In addition, document the shape, elevation and alignment of roads, dikes, levees and drains, including the size of bridge and roadway openings. | |
| United States | The Army Corps of Engineers has documented the high water marks for the flood and satellite imagery has defined flooded areas. |
| Minnesota | The states will be working with Task Force. |
| North Dakota | |
| Canada | <input type="checkbox"/> Data has been collected in connections with the “quick pass” model analysis. Information recovered by Environment Canada in collaboration with transportation and emergency preparedness agencies in the Valley is used to develop and validate hydrodynamic model work being undertaken. |
| Manitoba | <p>Approximately 500 high-water marks have been identified and surveyed in the Red River valley. New maps are being created that show:</p> <ul style="list-style-type: none"> <input type="checkbox"/> revised boundaries of the designated flood area (based on the 1997 flooded area); <input type="checkbox"/> 1997 flood levels (based on high water marks obtained following the 1997 flood); and <input type="checkbox"/> newly established flood protection levels—using aerial reconnaissance and ground truthing. <p>The information is being used in: delivering the flood-proofing program, guiding future development and assisting in the development of hydraulic models—the later in cooperation with the Task Force.</p> |
| Task Force | The Task Force commissioned the processing of RADARSAT satellite imaging of the flood within the basin and is recommending more detailed mapping throughout the basin. |

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| 27. Develop a consolidated database containing hydrometric, climatic, topographical and other technical data within the basin needed to improve forecasting and modeling capability. | |
| United States | <ul style="list-style-type: none"> ❑ Several US federal agencies identified database needs and means of making the data more readily available to those needing the information. ❑ States, the province, and Canadian agencies are working with the Task Force on database development. ❑ Under the Canada-Manitoba Agreement on Red River Flood Disaster Assistance, additional topographic information is being compiled to support hydraulic and watershed model development. ❑ Data policies currently in place are under review in Environment Canada with consideration for evolving client needs, including long-term watershed management and flood mitigation. |
| Minnesota | |
| North Dakota | |
| Canada | |
| Manitoba | |
| Task Force | |

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| The Hydrometric Gaging System | |
| 28. A high priority should be given to raising existing gages above the 1997 high-water level or replacing them. | |
| United States | <ul style="list-style-type: none"> ❑ U.S. Geological Survey is developing designs and costs for making several gages more flood damage resistant. ❑ The U.S. Geological Survey in cooperation with the NDSWC raised and repaired the Red River of the North at Wahpeton during the summer field season of 1998. Bids are ready to be let for a cooperative venture among the City of Fargo, the Corps of Engineers and the U.S. Geological Survey for installation of a flood-hardened stilling well for the Red River of the North at Fargo. This work is expected to be completed during the 1999 summer field season. ❑ Due to the installation of a removable diking system at East Grand Forks the gaging station was moved to a temporary site near Demers Bridge. USGS intends to install a flood-hardened gage on the Grand Forks side of the river as soon as the Grand Forks dike plans are firm. USGS has not secured partners to assist with the funding of a flood-hardened gage at Grand Forks at this time. |
| North Dakota | The State Water Commission and U.S. Geological Survey are developing designs and costs for hardening several gages. Construction is completed or planned on modifications to a few gages. |
| Canada/ Manitoba | Under the Canada-Manitoba Agreement on Red River Flood Disaster Assistance, some \$1 million, to be cost-shared equally, has been allotted for hydrometric network enhancements, including flood proofing of existing stations, providing improved data transmission capability at select stations, and the addition of new observation stations. Of the 86 stations included in the enhancement program, 51 are currently active, 23 will be reactivated, and 12 are new stations. The raising of gauges in Manitoba, as well as implementation of the other enhancements, will be completed by Environment Canada in the first 3 years of the 4-year Phase II Canada-Manitoba Partnership Agreement . |
| 29. Add to the current gaging system in the basin and, where needed, automate reporting to increase information for flood forecasters. | |
| United States | The North Dakota district of the U.S. Geological Survey has added 2 new river stage gages to provide additional flood warning for the City of Grand Forks (Red River of the North near Thompson, ND and the Red Lake River at Fisher, MN). USGS has also added telemetry to 2 existing gages (Forest River near Fordville, ND and Turtle River at Turtle River State Park near Arvilla, ND). Since the 1997 flood, most of the streamflow gaging stations in the North Dakota part of the basin have had instrumentation upgrades. All telemetered sites are available for the U.S. Geological Survey homepage on the Internet. |
| Minnesota | 10nw automated gages for flood warning have been added to the systems, and 3 existing gages have been updated with automated reporting equipment, as part of a statewide flood forecast/warning system initiative in Minnesota. |
| North Dakota | The State Water Commission cooperates and funds many of the USGS gages in North Dakota. |
| Canada/ Manitoba | Provincial funding was increased for 1999. Under a Phase 2 agreement with Canada (see #12 and #28) Manitoba Water Resources plans to modernize/upgrade 48 hydrometric stations, reactivate 23 others and establish 14 new ones in Manitoba—some with automated data retrieval capability to enable real-time access and to be compatible with Water Survey of Canada’s hydrometric network. |
| Task Force | Task Force will identify real-time flow gauging needs and recommend implementation methods. |

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| Airborne Gamma Surveys | |
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| 30. Depending on the flood outlook, the frequency of airborne gamma snow survey flights over the Manitoba portion of the Red River valley should be increased. Increasing the density of the network by adding more flight paths should also be considered. | |
| Manitoba | Water Resources will be ensuring funding is in place for additional snow survey flights as required. |
| Doppler Radar | |
| 31. In view of the critical need for accurate flood forecasting in the Red River valley, Environment Canada should identify Winnipeg as the highest priority location for the new radar installation. | |
| Canada | Doppler radar installation in Woodlands, Manitoba was completed in late fall of 1999 and opens officially May 01, 2000. |
| Ice Management | |
| 32. Innovative methods of reducing ice jams should be reviewed and expert advice sought on how ice jams may be diminished. This subject should be explored at a workshop on ice control held in the winter of 1998 and attended by international experts and basin officials. The adverse and beneficial effects of ice management on flooding and the environment need to be carefully considered. | |
| United States/Canada | <input type="checkbox"/> Environment Canada's National Hydrology Research Institute exploring cooperation with Army Corps of Engineers' Cold Regions Engineering Laboratory. |
| Minnesota | Ice dusting was conducted in March 1999. Results will be known in June. |
| North Dakota | The National Guard did an ice dusting research project in 1999 in cooperation with the Cold Regions Engineering Laboratory. |
| Manitoba | An ice management workshop took place during June 1999. New ice jam information will be applied to land use planning and subdivision application reviews. |
| Flood Information Archives | |
| 33. Information available to individuals, government and non-government organizations and others who contributed to the flood-fighting effort in 1997 should be gathered and made available at a central basin-wide archive or archives in each country. | |
| United States | A number of post-flood reports have been prepared. |
| Minnesota | Dept. of Natural Res. has started to do this. Minnesota has developed a clearinghouse for state information and data. More work is needed. |
| North Dakota | Dept of Emergency Management and the National Guard have developed a detailed list of agencies and individuals involved in the North Dakota flood fight. |
| Canada | Environment Canada has quality checked and has archived hydrometric data collected during the 1997 flood. |
| Manitoba | Information is being collected, but there has been no decision on a central repository. |
| Hazardous Products | |
| 34. Liaison among governments and industry associations throughout the basin should be encouraged and strengthened. Communications should be extended to other businesses, individual homeowners and farmers. | |
| United States | |
| Minnesota | Department of Public Safety – Div. of Emergency Management will coordinate liaison and communications activities. |
| North Dakota | |
| Canada | The Major Industrial Accidents Council of Canada has a Safer Communities Initiative underway, which promotes closer cooperation between industries and communities on emergency management programs for the manufacture, storage, and transportation of hazardous materials. |
| Manitoba | Manitoba Conservation (formerly Manitoba Environment) is consulting with Manitoba Agriculture regarding the publication of awareness information for on-farm storage of hazardous materials in flood prone areas. |

Government Follow-up On IJC Red River Flooding Interim Report Recommendations

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| 35. <i>The development of a broad public awareness program within the Red River floodplain should be started to encourage home-owners and farm operators to collect and properly dispose of all waste products that present a contamination hazard. There should also be an immediate and concerted effort to remove or secure hazardous materials stored in the floodplain.</i> | |
| United States | |
| Minnesota | Pollution Control Agency, Dept. of Health, and Dept. of Agriculture are reviewing the issue. |
| North Dakota | |
| Manitoba | Manitoba Conservation (formerly Manitoba Environment) is initiating a consultation process to expand the service areas for the household hazardous waste program and to publicize the program more effectively. This will provide a means for homeowners and farm operators to properly dispose of hazardous materials. |
| 36. <i>An inventory of all major potential sources of contamination should be developed and maintained, to include location, elevation, type of material, and amount. This inventory should extend to the agriculture industry and include intensive livestock operations.</i> | |
| United States | |
| Minnesota | Department of Public Safety – Div. of Emergency Management/Emergency Response Commission has collected the data. |
| North Dakota | The North Dakota State Health Department is reviewing what inventories of hazardous waste are available. There are lists available but the extent and detail are unclear. |
| Canada/ Manitoba | The cost-shared Canada-Manitoba Agreement on Red River Flood Disaster Assistance has allocated funds for the development of a GIS database of potential contamination sources. |
| Manitoba | Inventories are available for many types of major contaminants. These have not been consolidated into a single database. Additional data may be acquired through the Manitoba Conservation (formerly Manitoba Environment) licensing process, but this option has not yet been fully explored. Other options may also be available for acquiring and maintaining information on contaminant storage once a single database has been developed. Manitoba Agriculture is endeavoring to expand its inventory to include protection levels of manure storage lagoons and intensive livestock operations. Farm chemicals, petroleum products and other materials, such as waste, lumber, tires, tanks and old buildings would be identified and form part of a flood preparedness assessment. Intergovernmental Affairs (formerly Rural Development) is also maintaining an inventory of major sources of contamination. |
| 37. <i>A review of legislation on the management of hazardous materials should be conducted throughout the basin.</i> | |
| United States | |
| Minnesota | Department of Public Safety – Div. of Emergency Management/Emergency Response Commission will be reviewing legislation. |
| North Dakota | No changes to legislation are pending at this time. |
| Canada | |
| Manitoba | A planned review of the Manitoba Dangerous Goods Handling & Transportation Act will include discussions on special provisions for storage of hazardous materials in flood prone areas. |

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| Groundwater Contamination | |
| 38. <i>Conduct an inventory of all abandoned and active groundwater wells throughout the basin and institute an aggressive program of properly sealing abandoned wells and flood-proofing active wells against floodwater contamination from the surface.</i> | |
| Minnesota | The state has an active program to inventory and properly seal all unused wells on state-owned land. Unused private wells are required to be sealed by State law upon property transfer. |
| North Dakota | The State Health Department prepared a paper that reviews the potential of aquifer contamination in eastern North Dakota |
| Canada/ Manitoba | The cost-shared Canada-Manitoba Agreement on Red River Flood Disaster Assistance has allocated funds to develop an inventory of abandoned and active groundwater wells and to seal those wells that are subject to surface flooding. |
| Manitoba | Records of over 80,000 water wells are being maintained by Water Resources and new records are being added to databases. New legislation requiring a vendor to identify and properly seal all unused wells, is being prepared. |

Government Follow-up On IJC Red River Flooding Interim Report Recommendations

| Levee/Dike Design | |
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| 39. <i>The natural and beneficial functions of the floodplain must be considered in the design of new levees.</i> | |
| United States | <ul style="list-style-type: none"> ❑ The Army Corps of Engineers is placing greater emphasis on this in any structural flood control design, such as the proposed setback levees for the Grand Forks/East Grand Forks Flood Control Project. ❑ In coordination with the activities of the Task Force, FEMA has initiated through Project Impact a basin-wide Mitigation Initiative to increase awareness in both public and private sector of hazards and the need for a comprehensive strategy for hazard mitigation and floodplain management. This includes increasing understanding of the need for a balanced approach that includes an examination of all techniques both structural and nonstructural and is sensitive to the natural and beneficial functions of the Basin. |
| Minnesota | The state is promoting setback levees and has \$200,000 available for alternative flood control measures. |
| North Dakota | The State Water Commission promotes setback levees and has allocated \$337,500 for ring dike farmstead levees in two counties. |
| Canada | Canada supports consideration of non-structural measures including the natural and beneficial functions of the floodplain in a comprehensive strategy for flood hazard mitigation. |
| Manitoba | Water Resources is considering this issue in all of its dike designs. Intergovernmental Affairs (formerly Rural Development) is advising municipalities and developers to consider the effects and implications of new dike designs as part of its land use planning and development review processes. |
| Interbasin Hydraulic Connection | |
| 40. <i>Reasonable measures should be implemented, consistent with current operating plans, to prevent (if possible), the movement of water between the Red River and Mississippi River basins at Lake Traverse-Big Stone Lake.</i> | |
| United States | The Task Force investigated the issue with the assistance of the Army Corps of Engineers and the State of Minnesota and is recommending measures at Browns Valley, Minnesota.. |
| Minnesota | |
| Task Force | |