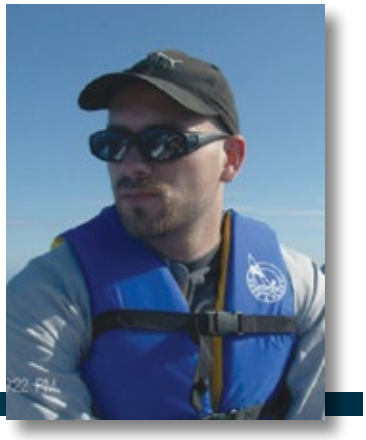
A Closer Look at Bow Basin Flood Mitigation Proposals



By David Robinson

The summer floods of 2013 made Calgarians aware of a harsh truth: flood risk levels in the city are high. According to Wolf Keller, engineer and chair of Calgary's Flood Mitigation Expert Management Panel, significant elements of the city's current infrastructure are inadequate for withstanding floods like those seen in 2013. This became apparent when many neighbourhoods, including the downtown core, were evacuated and went without power for days as many buildings in the region were vulnerable to flood waters. Those waters didn't treat kindly the critical heating, ventilation, and electrical systems found in many of their basements. Given that much of Calgary is built on the floodplains of two rivers, what flood protection solutions are being emphasized in the city?

In April 2014, the Government of Alberta announced $625 million in funding towards flood mitigation projects across the province. Of this budget, a whopping $594 million (just over 95 percent of the total funding amount) will go towards engineered solutions such as hardening riverbanks and constructing diversions and dams. Hardening involves lining riverbanks with riprap – boulders, chunks of concrete, and other such hard rubble. Riprap is quick to implement and may reduce site erosion at lower flows, but it has numerous disadvantages. Habitat in armored areas, especially those with an abundance of soft sediment and vegetation, will be destroyed. Bank armoring is also ineffective at containing floodwater and may wash away during high flows. Narrowing river channels this way will result in higher-velocity flows during seasonal floods that actually will increase downstream erosion and reduce the river's capacity to hold higher flows.

West of Calgary the Government of Alberta is exploring reservoir construction to accommodate excess floodwaters when needed. A so-called "Room for the River" diversion is one such structure planned for the Springbank region that will divert water from the Elbow River. This presents complications with private and grazing lands. Landowners and leaseholders will have to expect periodic flooding on their land. Fortunately, Trout Unlimited biologist, Lesley Peterson, suspects this project would do less damage to Elbow River fish habitat than the McLean Creek dry dam. However, he would ultimately prefer to see communities moved from the floodplains rather than turn to water diversion projects. As the article goes to press, it seems most likely that the diversion will be a dry reservoir designed to fill only during periods of extremely high flows. This will likely not disrupt smaller cyclic flooding events, ensuring silt and nutrient recycling continues as normal. Trout Unlimited hopes screening devices or salvaging programs will be in place to ensure fish, including the threatened bull trout native to Elbow waters, are not lost to the reservoir when it fills. The end of 2015 should see the initial review for this project completed. The Prentice government gave the Springbank diversion the green light on September 26, putting it on the fast track for completion.

Another proposed structure is the Glenmore Reservoir Diversion. It would channel excess water from the reservoir through an eastbound tunnel and return it to the Bow south of downtown. The exact tunnel location is still being deliberated, but seems most likely to run under Heritage Drive and terminate in Carburn Park. Considering most of central Calgary's flooding last year was along the Elbow, diverting any excess water this way is expected to significantly reduce the amount of water that breaches riverside homes and downtown streets. The tunnel's feasibility study is still being reviewed.

Potential ecological impacts of the Glenmore Diversion are important to consider, but are likely significantly less than what a full dam structure upstream would entail. Because most of the tunnel structure will be deep underground any impacts to river ecology would be seen at the ends where it breaches the surface. Apart from typical issues associated with surveying and construction (noise and waste, for example) there are concerns the intake and outlet structures may disrupt nearby river microhabitats. Changes to erosion and sedimentation of the banks, water turbidity, and soil quality downstream in the Bow River are risks to be expected when the tunnel releases large volumes

of floodwaters. This could have large impacts on the habitats of fish and other aquatic animals in the Bow River and adjacent parks downstream of the tunnel. The feasibility study promises staging areas will be small and located distant from ecologically sensitive areas along the river. It also proposes, without offering specifics, engineering controls to mitigate impacts of the floodwaters' outflow. In the event of habitat damage, habitat compensation may be offered, although that undertaking would be uncertain, perhaps especially so in light of the recently watered down federal *Fisheries Act*.

Further up the Elbow River there is still a possibility of constructing a 50 metre tall, gated dam near McLean Creek, upstream of the village of Bragg Creek. This complex project would require relocating a large part of a highway and a bridge crossing the Elbow. The McLean Creek dam may hold nearly 50 million cubic metres of water and would reduce the volume of water flowing downstream during 1:100 year or less historic flows. Above 1:100 year levels, it would release the flows once storage is filled. We note that 1:100 flood levels are about 30 percent less than the June 2013 flood storage requirement and that the 20th century historic record may not predict well climate change-affected flow variation.

As with all dams, the potential environmental impacts associated with this project are huge. Inundating the upstream region during a flood will devastate natural vegetation and forest communities. Meanwhile, downstream areas will be affected by disruptions in sediment deposition that may exacerbate riverbank erosion, disrupt natural turbidity levels, and trouble aquatic species. Bull trout, our 'threatened' provincial fish, still occupy this section of the Elbow River. If flows are higher than a 1:200 year level (about 30 percent above the June 2013 flood storage requirement) an earth cut overflow channel would divert waters into the downstream Elbow via Maclean Creek. Significant erosion in the channel area and McLean Creek would occur in this event. This proposal may therefore convey a false sense of security to the downstream acreage owners and hamlet residents. Alternatives should be pursued instead. Vulnerable homes and infrastructure in low-density areas should be moved away from the river; more of the floodplain area should be available again to slow and disperse high waters. The dam is currently in early stages of planning; a three-month environmental review will be completed before any development progresses.

> Fifty-five percent of Albertans believe the severe flooding of 2013 was a symptom of climate change.
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> - Ipsos Reid/CTV poll, December 2013.

On the Bow River, TransAlta and the Alberta government formed a long-term agreement to modify management of the Ghost Reservoir to increase its flood water holding capacity. While more information on the environmental impacts of this modification should be disclosed, this decision to make better use of existing infrastructure appears to involve minimal new ecological impacts. This seems positive.

Meanwhile, on the Bow River's Highwood tributary further south, the Alberta government recently approved a 'south' diversion project that will connect the Highwood and Little Bow rivers just south of High River. This diversion will have the capacity to handle up to 500 cubic metres of water per second and would significantly lessen the blow another 2013 magnitude flood would deliver to that area. With this diversion come many of the same concerns identified regarding the aforementioned projects, including sedimentation disruption and changes to turbidity levels during flooding. Bull trout have a home in this river system as well.

Such structures are not permanent solutions. Floods greater than the 2013 event occur so infrequently we cannot be certain of the damage they would create. While the proposed structures may be able to withstand floods up to the magnitudes experienced in 2013, the likelihood they would ***eventually*** experience a flood they were not built to withstand should still be considered. What importance should be attached to these possibilities? Additionally, the costs of structural diversions and barriers are not one-time investments. These structures require regular supervision, inspection, and maintenance costs for repairs and upkeep. Once that 95 percent of flood recovery funds are invested in building them, they will require regular additional financing to ensure they remain up to snuff. Riparian and wetland habitats, on the other hand, are largely self-sustaining once established if they can be protected from destructive human activities.

The large amount of money allocated to these hard engineering approaches that may or may not withstand climate change-affected weather patterns leaves a measly $31 million for natural flood recovery management. While this is certainly better than nothing AWA would prefer to see greater emphasis placed on renaturalizing river floodplains in low-density areas. Homes and infrastructure in those areas should be relocated.

About one-third of the 'natural recovery' funding, $10 million, will go to restoring fish habitats damaged by the 2013 flood. The remaining $21 million will go toward a Watershed Resiliency and Restoration Program (WRRP); this will focus on creating and improving

riparian and wetland habitats to enhance watershed functioning. According to a guide released by Alberta Environment and Sustainable Resource Development (ESRD), the WRRP will consist of education, stewardship, restoration, conservation, and scientific research components to bolster the watershed's resilience to flooding and droughts.

ESRD established a multi-disciplinary External Advisory Committee to provide guidance for the WRRP's progress and funding. Among those recruited for the committee are freshwater and wetland conservation societies such as Ducks Unlimited Canada, Trout Unlimited Canada, and the Alberta Riparian Habitat Management Society (more commonly known as Cows and Fish). AWA spoke to representatives of each of these organizations: they are all pleased that, through the WRRP, the Government of Alberta recognizes that riparian and wetland ecosystems are important. They also are pleased that ENGOs and Alberta communities have the opportunity to do something positive with flood recovery funding.

At the time of writing the specifics of the organizations' duties are still being worked out. However, there are a number of things they hope to be involved in. Ducks Unlimited Canada is interested in wetland restoration and would likely focus its efforts on small (approximately one acre or smaller) wetland habitats that were lost to drainage as those provide the greatest productivity for waterfowl. Cows and Fish wishes to work with landowners and other partners to assist with management improvements on riparian lands, including a modest amount of education and awareness about the importance of riparian health. Trout Unlimited intends to apply for the January 2015 round of funding and hopes to be involved in restoring riparian and in-stream fish habitat.

There are opportunities for improvement everywhere along the province's watersheds and adequately funded WRRP projects can facilitate that. According to Norine Ambrose, Executive Director with Cows and Fish, habitat restoration and monitoring may be inexpensive in comparison to large-scale engineering projects, but they require access to land and landowner/land manager participation. Although many landowners are already stewards of the land, additional funding will help them implement changes that might otherwise be cost-prohibitive or hard to accomplish without the technical support they need. Barry Bishop, Alberta Head of Conversation Programs with Ducks Unlimited Canada, agrees that the majority of funding will likely go to securing land access agreements for wetland restoration.

There are still concerns over the program's longevity beyond its current three-year plan. Landowners and policies may change in the future, meaning the security of restored habitats is not set in stone. Additionally, if the WRRP's geographic focus is downriver of Calgary, the city and upstream communities are not likely to see the benefits riparian management offers for flood mitigation.

Dave Mayhood stressed in the June/July 2014 issue of *Wild Lands Advocate* that flooding is a natural and inevitable characteristic of river systems and rivers need room to expand during these times of increased flow. The WRRP guide explicitly says that Alberta was in dire need of a new flood management program to ensure long-term mitigation of future floods and droughts. Then-ESRD Minister Robin Campbell himself stated in an August interview with *Metro News* that healthy watersheds are "our first and arguably best defence against flood and drought." Considering how badly it is needed, the announcement of the WRRP is promising but we wish more of Alberta's flood recovery funds were devoted to the program.

Are construction projects and wetland sinks the only solutions available to mitigate flood damage? Keller mentioned that moving development away from water is sometimes more practical than moving water from development. It would be good to see more serious attention paid to that solution. Moving current infrastructure and focusing the development of new infrastructure to areas outside of the floodplain will give rivers the room they need to expand without the damage and disruption they can cause. Doing so would be very costly, but it would presumably be a one-time cost that would save money in the long-term. This could be a viable option for Bragg Creek and other low-density communities along the watershed. To date, only one entire floodplain community in High River has been required to relocate; a voluntary relocation program has been offered to only 250 other Alberta families to move away from flood-prone areas. Alternatively, in high-density areas where relocation is impractical, increasing the resiliency of existing structures will reduce the magnitude of disruption and repair costs in affected areas. There is $90 million allocated for bolstering current government buildings, including schools and hospitals.

The overwhelming funding preference for building flood mitigation infrastructure gives the impression that watershed ecology is only of symbolic importance to the Alberta government. Ideally, more attention should be placed on developing and maintaining river sinks that will not disrupt natural habitats. They are very good long-term flood mitigation solutions. This is the message AWA continues to deliver to our elected officials.