CHANNEL MIGRATION EASEMENTS IN MONTANA:

HOW CONSERVATION EASEMENTS AND RIVERS CAN WORK TOGETHER

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Contents

List of Figures

Acknowledgments

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Finally, we would like to recognize the current and past members of the MARS board and staff who contributed by writing this paper and developing the concept of CME's. We welcome feedback and comments that will help us revise and improve this white paper and ultimately implement preserve more Channel Migration Zones throughout the state[1].

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1 Introduction

Channel Migration Easements are a unique and effective conservation strategy designed to enable large rivers and their floodplains to function at their fullest potential (USACE 2015). They are a pragmatic tool that can achieve conservation at a large scale by compensating landowners in return for giving up their right to install features such as armor, levees, dikes, or flow deflectors that reduce a river's ability to naturally migrate and access its floodplain. The use of Channel Migration Easements (CMEs) as a means to ensure long term river and floodplain function is not well understood by practitioners, as only two such easements have been successfully implemented in Montana. The purpose of this paper is to articulate the benefits of allowing a river to freely migrate, provide an explanation of various mechanisms available to preserve riverine corridors and functions, define how Channel Migration Easements differ from previously utilized conservation strategies, answer frequently asked questions, and provide examples of CMEs developed through Montana Aquatic Resources Services' (MARS) Channel Migration Easement Program[2]. The audience for this paper includes agencies interested in funding drought resilience and river conservation efforts, land trusts, Conservation Districts, attorneys, biologists, mitigation practitioners, and landowners interested maintaining riverfront property in its natural state. While a basis for advocating the use of CMEs in Montana is provided in the main body of this paper, additional details including legal and technical considerations, planning frameworks, and case studies are provided as appendices.

MARS recognizes that conservation easements are complex, and our intention is to present guidance on CME's based on our experiences to date for a wide audience. We recognize that tax codes, case law, funding sources, and enabling conditions are constantly evolving. Each combination of landowner, attorney, appraiser, and easement holder will approach this undertaking differently due to the condition of the property, the landowner's tax liability, and the mutually desired outcomes. There are numerous textbooks (e.g., Conservation Easement Handbook (Beyers and Ponte 2005), A Tax Guide to Conservation Easements (Linstrom 2008) and websites (e.g., Land Trust Alliance, Montana Association of Land Trusts) that provide additional information.

[2] MARS' Channel Migration Easement Program has successfully completed two CME's on the Yellowstone River to date (one in 2016, and one in 2017). This document was written based on these recent experiences. MARS envisions that the CME concept will be applied to other Montana rivers with local and regional project partners in the future. Other rivers in Montana may have different ecological conditions and characteristics than those described in Section 2, so the application of CME's in other watersheds will increase our collective experience in the future to leverage benefits Montana's river systems more fully.

2 Ecological Benefits of Natural Fluvial Processes

The primary goal of a Channel Migration Easement is the promotion of floodplain connectivity and unrestricted lateral movement of a river over time to ensure the long term health of river systems. The process of channel migration is a critical component of river and floodplain function. Some of the important benefits of lateral channel movement include:

- Channel migration allows stream systems to respond to changes in sediment regime and/or hydrology. Streams that are locked in place cannot adjust their form to maintain equilibrium in the event of altered magnitudes, rates, or patterns of inputs (Section 2.1).
- Channel movement through bank erosion and sediment deposition promotes riparian forest regeneration by creating open bar area available for woody riparian seedling colonization (Section 2.2).
- Channel movement through bank erosion and sediment deposition promotes instream habitat creation by recruiting woody debris, and fresh, non-imbedded spawning gravels (Section 2.3).
- Floodplain connectivity improves water quality and flood attenuation (Section 2.4).

Each of these benefits of river movement has a cascading effect with respect to elements such as riparian habitat, nutrient cycling, flood mitigation, macroinvertebrate health, water quality, and off-stream habitats such as slackwater areas and wetlands. In contrast, the engineered preclusion of channel movement through extensive bank armoring results in costly expenditures that commonly create channel instability and a spiral of continued unanticipated engineering works that drain financial resources and further degrade river health.

2.1 Stream Channel Movement—Migration and Avulsion

Rivers that are described as “alluvial” flow primarily through sediment deposited by the stream itself. This sediment is in a constant state of reworking as rivers erode areas of relatively high energy and deposit sediment in more passive zones.

The resulting stream corridor consists of a complex mosaic of erosional and depositional areas that reflect formations developed over thousands of years. The mosaic of an actively migrating stream corridor is both spatial and temporal. These mosaics create a footprint of historic channel occupation, or a “historic migration zone” (Figure 1). In contrast, streams that are not able to move laterally are simplified, sometimes to the width of the channel itself (Figure 2). These channels function as simple conveyors of sediment and water, without the ecological benefit of temporal or spatial diversity.

River channels move through two major processes: migration and avulsion. ***Channel migration*** refers to the progressive “marching” of a river across its floodplain, typically on meander bends. Meanders tend to develop naturally when asymmetric flow paths are generated, and that asymmetry is translated downstream as alternating meander bends (Figure 3). This meander bend formation is characterized by outside bend erosion and inside bend deposition on point bars (Figure 4). On actively meandering rivers, these geomorphic processes are important for riparian vegetation communities, as the new bar surfaces provide colonization areas for young trees such as cottonwoods (Figure 5 and Figure 6). Bank erosion also results in the recruitment of woody debris, which contributes to fish habitat quality and complexity (Figure 7).

Whereas channel migration refers to the process of progressive lateral channel movement, ***avulsion*** refers to the wholesale creation of a new channel on the floodplain. This process typically occurs during flood events, when overbank flows occupy and rapidly develop a new channel course. One example of avulsion is meander bend cutoff (Figure 8). Meander cutoff is natural process that allows over-lengthened bendways to regain slope and better convey sediment.

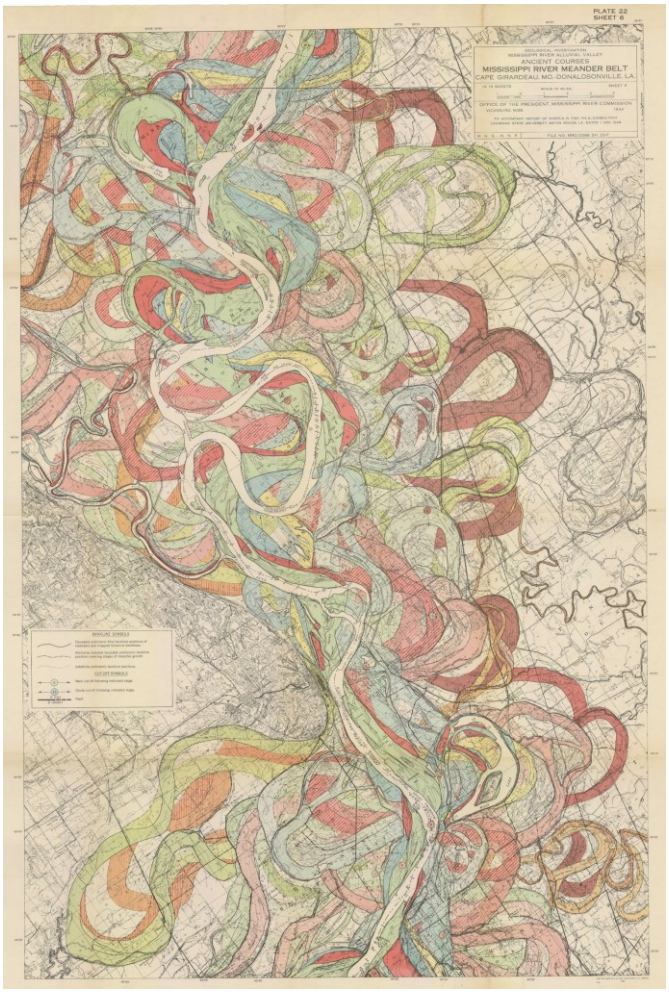

Figure 1. Historic migration areas of the Mississippi River as mapped by Fisk (1944).

Figure 2. Sacramento River California showing Channel Migration Zone confined to channel width. Source: K. Boyd

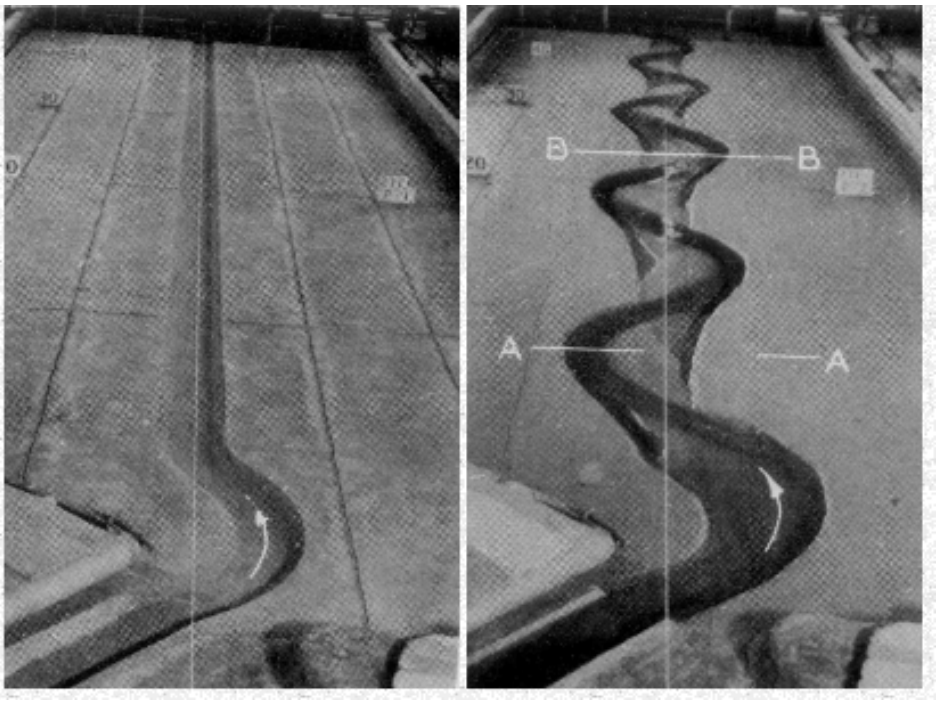

Figure 3. Formation of a meandering channel in a flume with sand; one bend was excavated on the upper end of a straight channel (left). After 3 hours of water flow regular meanders have formed (right). View is in the downstream direction (from Schumm et al. 1987).

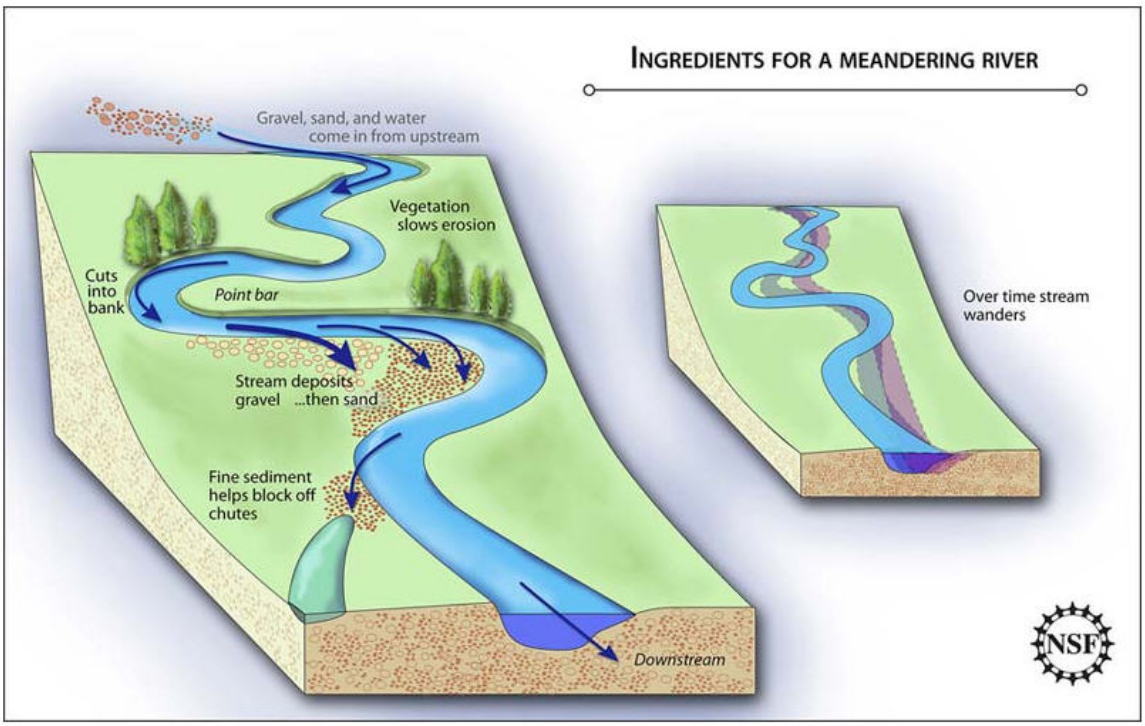

Figure 4. Schematic drawing of meandering river migration concept (Source: www.berkeley.edu).

Figure 5. View across Blackfoot River showing point bar with increasingly young vegetation approaching channel edge. Photo Credit: K. Boyd

Figure 6. Yellowstone River cottonwood age classes showing progressively younger trees in direction of channel movement – polygons are labeled by average age of trees in years (Merigliano and Polzin 2003).

Figure 7. Woody debris recruitment from eroding banklines, Yellowstone River near Forsyth. Photo Credit: K. Boyd

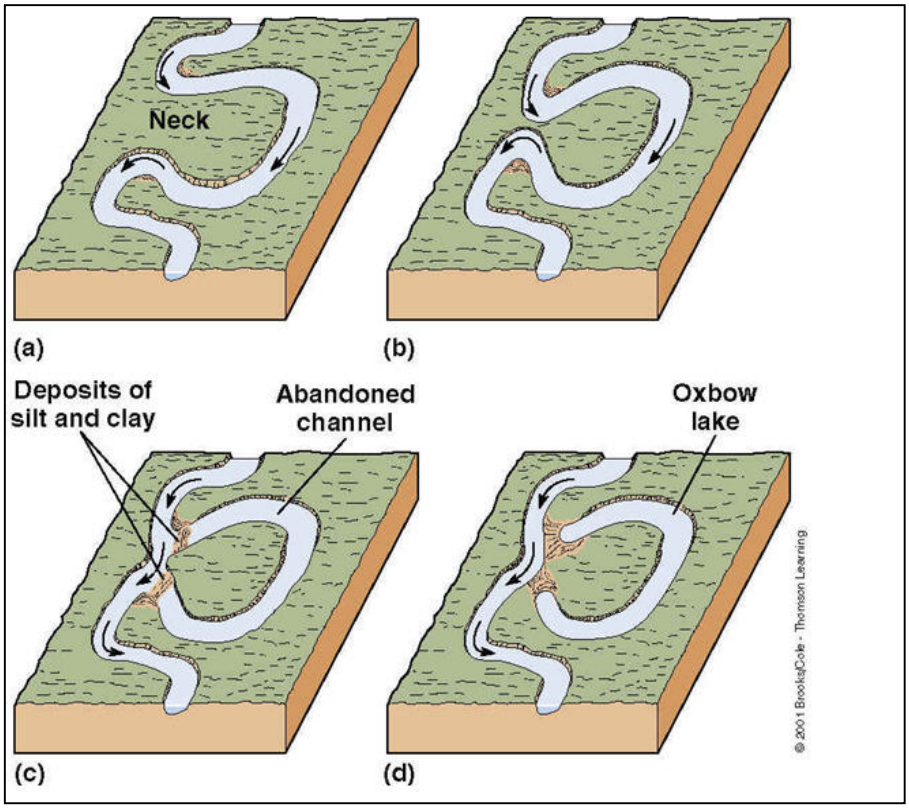

Figure 8. Schematic diagram of meander cutoff (Source: www.uwsp.edu).

The process of channel avulsion across a bendway core is shown in Figure 9. This photo was taken from a helicopter by Montana Department of Natural Resources and Conservation (DNRC) staff during the 2008 flood on the East Gallatin River. The photo shows a typical bendway shape, with floodwaters flowing over the core of the bend. On the downstream end of the bend (left side of photo), the overflows re-enter the main channel over a steep bank edge, creating a headcut. If the flood is large enough or long enough, the headcut will migrate up-valley through the core of the bend and excavate a cutoff channel. On this particular bend, the flood dissipated before cutoff occurred, resulting in a "failed avulsion". Figure 10 shows a completed avulsion that occurred on the Musselshell River in 2011, abandoning over a half mile long section of river. In addition to bendway cutoffs, avulsions occur where long segments of channel relocate to new areas on the floodplain. These relocations may reflect capture of an abandoned channel, a tributary channel, or creation of an entirely new channel in the floodplain. These floodplain avulsions are less common than meander cutoffs, and require a certain degree of instability to occur. Figure 11 shows an example of a ~0.5-mile-long avulsion on the Jefferson River just downstream of the Big Hole confluence. The disturbances associated with channel avulsions are similar to migration in that they create new open bar surfaces that are ripe for woody vegetation colonization in abandoned channel areas (Figure 12).

The fundamental approach to Channel Migration Zone (CMZ) mapping is to identify the corridor area that a stream channel or series of stream channels can be expected to occupy over a given timeframe – typically 100 years (Rapp and Abbe 2003). An example of a CMZ is provided in Figure 13 and a detailed description of the process and output of CMZ mapping is provided in Appendix B.

Figure 9. Example of the avulsion process, East Gallatin River May 2008 (DNRC), flow direction is right to left. Source: K. Boyd

Figure 10. Major bendway cutoff via avulsion, Musselshell River (flow is left to right). Source: K. Boyd

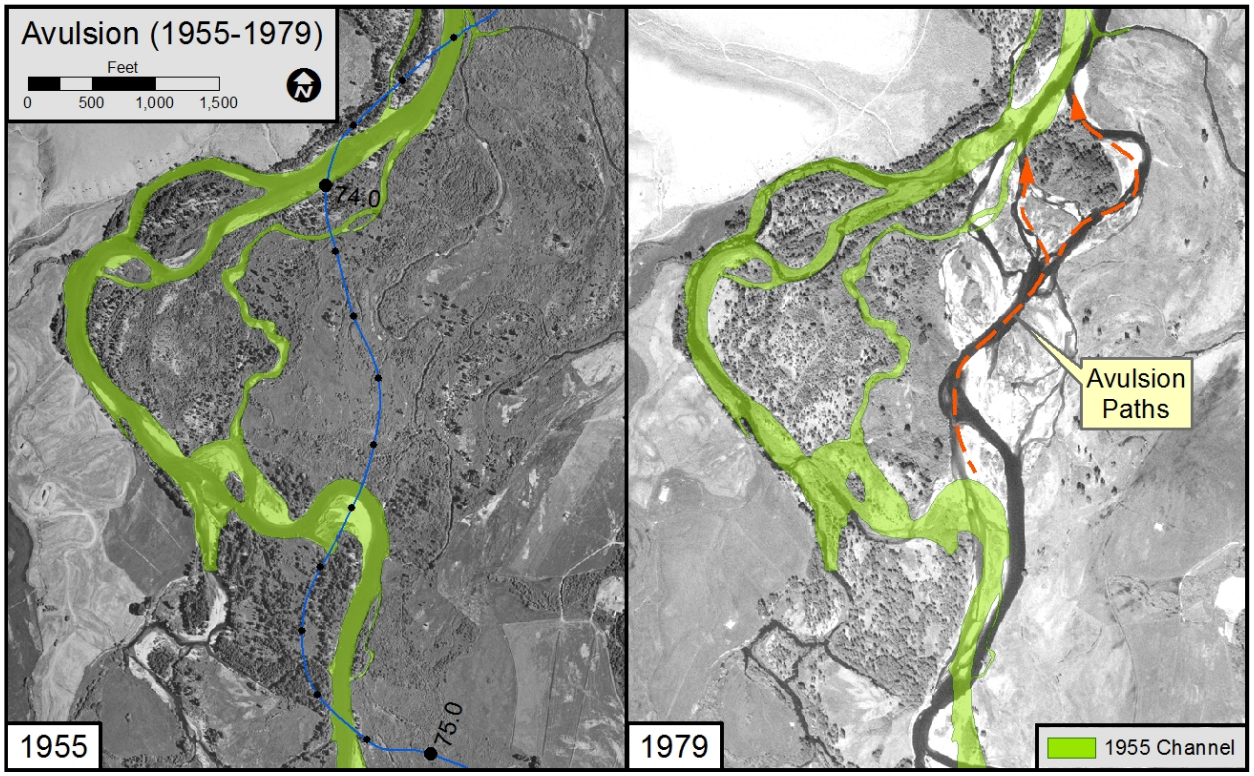

Figure 11. Major avulsion on Upper Jefferson River between 1955 and 1979 that created a ~1.5-mile-long new channel. Source: K. Boyd

Figure 12. Cottonwood colonization following a major avulsion, 2011 Musselshell River flood. Photo Credit: K. Boyd

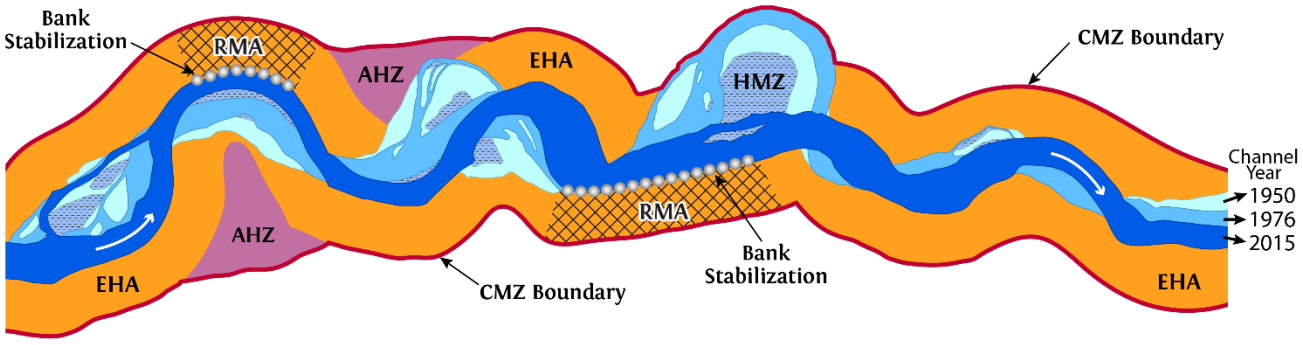

Figure 13. Example of a Channel Migration Zone map showing Erosion Hazard Areas (EHA), Avulsion Hazard Zones (AHZ), Restricted Migration Areas (RMA), and the Historic Migration Zone (HMZ). Source: K. Boyd

2.2 Riparian Forests, Birds and Wildlife

Floodplain vegetation communities have evolved with cycles of disturbance. The dominant tree species along many of Montana's river corridors are cottonwoods. Cottonwoods have evolved with cycles of erosion, deposition, and periodic flooding. They require annual flood pulses to bring nutrient rich sediments and distribute mature catkin seeds into forests during high water, which then recede to expose dry ground for seed germination and seedling growth in the late spring and early summer. Rivers locked in place do not have flood-pulse cycles and often do not have young cottonwood seedlings growing in the understory due to a lack of substrate and fresh point bars that are suitable for cottonwood recruitment. Mature cottonwoods are a source of the floodplain's woody debris and snags, which are nesting and perching habitat for osprey, bald eagles, and cavity-nesting birds including the redheaded woodpecker. Riparian corridors are also vegetated with a number of willow species, which are a diverse group of shrubs that are ubiquitous throughout the state of Montana. Willows are fast-growing and have a fibrous root system that can stabilize banklines, islands, and point bars. The branches provide browse for ungulates, and the canopy provides habitat for pollinators and songbirds. Willows have also evolved to regenerate in disturbed environments and to colonize newly deposited floodplain sediment.

Invasive species such as Russian olive and tamarisk are a threat to riparian forests. These species are stress-tolerant and take advantage of old side channels, cottonwood understory, and edge habitat along roads and fields. Russian olive was once used by the U.S. Fish and Wildlife Service for windbreaks and for bird habitat, and is now widespread throughout the west. Tamarisk is more salt and drought tolerant than native vegetation and expands into former floodplains that have been disconnected from the river. Both of these species have potential to limit the regeneration of desirable woody vegetation and eventually displace it, which will cause the habitat quality of the riparian corridor to decline over time (Figure 14).

Riparian forests provide critical habitat and movement corridors for wildlife as they access food and water. Riparian forests offer shade and respite from extreme temperatures and high winds. The dense vegetation provides thermal and security cover for species as they travel across the upland-riparian transition zone and along the upstream-downstream continuum. Lateral habitat connectivity is critically important for wildlife movement, and preserving riparian corridors is one way to offset some of the fragmentation that has occurred in the past century due to transportation infrastructure and development.

Figure 14. Russian olive encroachment limits willow and cottonwood regeneration along a stretch of stream channel. Photo Credit: K. Boyd

2.3 Fisheries

Freshwater fishes evolved and adapted to changing conditions across the northern tier of North America since the Pleistocene glaciation. As glaciers receded, the entire land and waterscape was reset, forcing fish and aquatic creatures to reinvade and reinvent their life history strategies. Melting glaciers amplified fluvial processes, providing abundant sources of water and sediment that had been held in abeyance for millennia. For thousands of years, the fluvial processes of erosion and deposition were on hyperdrive, dumping boulders, gravels and ice during spates of tremendous flow, and quieting to trickles during times of enduring cold. Over time, glacier-driven rivers transformed into snowmelt-driven rivers and the wide diversity of fishes inhabiting the northern tier of the United States invaded and adapted to new, less Arctic conditions. Each species native to the northern tier, regardless of its phlyogenic family of origin, adapted to post-glacial conditions. Post-glacial fluvial processes like erratic water supply, widely fluctuating water temperatures, and punctuated sediment transport shaped new migration patterns, spawning timing and locations, rearing sites for young fish, and preferences for seasonal habitats, like summer feeding or optimal winter habitats.

Fluvial processes shaped behavior of fishes and their ability to survive in riverine conditions familiar to us today. Migrations of most fish are timed with fluvial cycles to take advantage of abundance of water during snowmelt in the spring, when flows are high and sediment transport is in high gear. Erosion and deposition shape habitat and fish behavior. Most inland salmonids – trout, char, grayling and whitefish – time their spring migrations with abundant flows after a long winter beneath the ice. Snowmelt mobilizes silts, sands, and gravels and refreshes stream channels, creating ideal spawning beds in which they bury eggs. Prairie minnow species may have spent the winter in stagnant, isolated pools in prairie rivulets far from major rivers, but respond quickly to sudden surges of runoff flow by spawning, and retreating to larger streams. Ancient pallid sturgeon and paddlefish, remnants of dinosaur age charged up the major rivers to spawn on freshly deposited gravel as far as they could travel while turbid runoff coated and protected their eggs. Side channels and backwaters carved during runoff provide warm, productive rearing sites for a diversity of young fish but are too risky for big, predatory fish to occupy. Cottonwoods tumbled into the torrents of runoff eventually become anchored, creating dense cover for a wide variety of aquatic life through summer, fall and winter seasons after their demise (Figure 15).

Figure 15. Cottonwood debris creating habitat for invertebrates and fish on the Yellowstone. Photo Credit: K. Boyd

Without annual spring flushes driving river erosion and deposition cycles, few fishes could maintain healthy populations. The more rivers become constrained by riprap and floodplain-choking dikes, railroads and highways, the less suitable habitat becomes for native riverine fishes shaped over 10,000 years of flooding and drought. Rivers that lose their natural patterns of flow, deposition, and erosion suffer a loss of diverse habitats that support diverse aquatic life. Loss of diverse aquatic life results in loss of resiliency of aquatic communities that support abundant wildlife resources and recreational fisheries.

2.4 Water Quality & Flood Attenuation

Healthy floodplains, wetlands, and riparian forests lining rivers are integral parts of a healthy river system. During the annual flood cycle, lowlands lining rivers become inundated as snowmelts overfills the river channel (Figure 16). When rivers run high, they spill out across their floodplain, recharging the groundwater, and storing sediment. Floodwaters are absorbed into floodplains like a sponge, which filters, and stores groundwater destined to return to the stream later in the year. Floodplains intercept and slow down floodwaters, which causes fine sediments like silts along with organic matter to settle out and become the fertile soils that support agriculture. By storing sediment and filtering surface water through dense vegetation and infiltrating into the ground, contaminants become trapped in the soil and are broken down by microbes in soils into nutrients that fuel plant growth.

When a river can spread out its energy across a broad floodplain it has less erosive power, especially when it is strained through dense riparian trees and shrubs (Figure 17). When a river is confined by dikes or riprap, and floodwater are unable to spread out across a floodplain, its erosive energy is focused against its banks and channel bed causing an imbalance of erosion and deposition. This imbalance results in a cycle of instability, where the accelerated erosion generates an overabundance of sediments in the channel, which then accelerates erosion further.

Recent oil spills present a paradigm study in floodplain function. During high water in 2011, a pipeline burst near Laurel, Montana, resulting in the release of thousands of gallons of crude oil into the Yellowstone River. The high flows dispersed oil across the river's floodplain, allowing much of it to be trapped by plants and soils rather than continuing further downriver. The connectivity between the river and its floodplain helped to attenuate the spill, limiting its dispersal to a 100-mile reach of the Yellowstone. While short term consequences of the spill included devastated crops, these areas are likely to recover healthy floodplain vegetation over the long term as some of the oil breaks down. Had much of the river been confined from its floodplain, distribution of the oil and its detrimental effects could have spread much further downriver.

Figure 16. Spring flooding brings high water to a public access site on the Yellowstone. Photo Credit: K. Boyd

Figure 17. Riparian forests slow flood waters and reduce erosive energy. Photo Credit: K. Boyd

3 Incentive-Based Strategies for Riparian and Floodplain Conservation

A variety of mechanisms are available to conserve riparian and floodplain corridors and promote the ecological benefits provided by functional riverine systems as described above. The following section begins by describing the basis of constitutionally-protected private property rights in the United States and how private landowners can grant a portion of their property rights in the form of easements.

The use of channel migration easements as a specialized form of conservation easement is discussed, as well as the differences between conservation easements and deed restrictions. Finally, this section explains the role of land trusts and partnering conservation organizations such as Montana Aquatic Resources Services (MARS) in the planning and management of conserved lands.

3.1 Private Property Rights—A Bundle of Sticks

The set of private property rights held by an owner of real property is often characterized as a "bundle of sticks." The owner of a bundle of sticks can use them as they see fit, within certain limits. The owner can take a stick from its bundle and give it away, sell it, or burn it for warmth, but the owner can't use the stick to beat its neighbor. Likewise, the owner can sell the bundle in its entirety, or divide it up into component pieces. With real property in land, the biggest bundle of sticks is called "fee simple absolute." With fee simple ownership, a landowner possesses a full set of property rights, including the rights of possession, control, exclusion, enjoyment, and disposition. In other words, the full set of property rights means the owner has exclusive vested title to the property, to manage the property as they wish, to exclude others from using or crossing the property, to quietly enjoy the property and reap the benefits, and to transfer ownership to others through sale, gift or by passing the property to its heirs. The property rights are protected by the U.S. Constitution and state constitutions and cannot be confiscated by the government without due process and just compensation. However, property rights are subject to laws that prevent an owner from abusing its property to the detriment of its neighbors or the public at large.

An owner of real property can sever its property rights and grant certain rights to others. An example of a transfer of property rights to another is a mortgage. Ordinarily, a fee simple absolute owner has the right to sell the property to a willing buyer. But in exchange for a mortgage loan, the landowner agrees it will not sell or transfer ownership of the property until it pays the mortgage company the balance of the loan, with interest. Easements are another example of a servitude, or a lessening of one's bundle of property rights through sale or transfer. For example, Landowner A owns a ranch in fee simple absolute – the whole bundle of sticks. Landowner B owns the next property over, but has no way to access its land. Landowner A possesses the right to exclude Landowner B, but as a good neighbor Landowner A grants Landowner B the right to pass through its land, for a small fee. Landowner B now owns an easement, or a property right that was a portion of Landowner A's right to exclude. The following section describes the basic traits of two kinds of servitudes that may be utilized to achieve conservation goals: conservation easements and deed restrictions.

3.2 Deed Restrictions vs. Conservation Easements

Landowners seeking to preserve their lands in a natural state into the future have three options. They can act as good stewards in their lifetime and pass along their property to their heirs or future owners in good condition, but have limited power to conserve the property beyond their lifetime. Montana allows landowners to preserve natural habitats into the future through conservation easements or through deed restrictions. Both are types of legal "servitudes" or restrictions on uses of private lands voluntarily imposed on the land by the landowner through legal processes. State law in Montana recognizes conservation of natural habitats and open space as qualified purposes for deed restrictions[3] and for conservation easements.[4] The primary differences between the two involve the rigor of the process to create the servitude, the costs, and who possesses the authority to enforce restrictions.

Deed restrictions are servitudes often called restrictive covenants in which a private landowner promises not to undertake certain activities on its land. In a conservation servitude, a deed restriction would preclude specified activities that could affect natural values on the land. The process to create a deed restriction is simpler than a conservation easement, where the landowner's promises are detailed in a contract, or deed restriction instrument, that is recorded in public records at the County Clerk and Recorder's office. They remain in place for the specified term, unless modified or overturned by a judge in state District Court. Unless carefully crafted, deed restrictions may not bind future owners of the property. Generally, deed restrictions can be enforced by the person or entity specified in the instrument. In some cases, a state or federal agency, the county planner, or even neighbors in a subdivision may have standing to enforce the deed restriction. Depending on the nature of the deed restriction, they may sit passively for decades without any apparent action until someone notices a violation or a subsequent purchaser of the affected land attempts to nullify the restrictions.

Conservation easements are a special type of servitude, or easement, by which a landowner voluntarily transfers some of its property rights to a land trust or public agency to protect certain natural attributes of its property. In contrast to deed restrictions, a conservation easement is a specialized kind of servitude specifically designed for conserving open spaces or natural habitats. Unlike a deed restriction, a conservation easement is held and enforced by a third party – a land trust or public agency. The landowner and land trust draft a deed of conservation easement, which is similar to a deed restriction but much more detailed. The land trust must document the existing condition of the property conditions, known as a baseline report, which is the reference point for future restrictions (and is an IRS requirement if the landowner seeks potential federal tax benefits by reporting the gift of a conservation easement) (Beyers and Ponte 2005). Once the landowner and land trust settle on the types of activities the landowner is willing to forego, the deed of conservation easement is drafted. The land trust must conduct an intensive due diligence investigation and the final terms of the easement are settled at closing. After closing, the deed of conservation easement is filed in public records at the County Clerk and Recorder's office. Unlike a deed restriction, a conservation easement creates an active, long-term relationship between the land trust and landowner. This close working relationship is fostered at least annually, when the land trust makes its yearly visit to monitor the property under easement. Most importantly, conservation easements are voluntary, private transactions between a landowner and a land trust, where the landowner decides what property rights it retains and which rights it is willing to forego to conserve natural conditions on its lands.

[3] Mont. Code Ann. §70-17-101(18).
[4] Mont. Code Ann. §76.6-103.

3.3 Channel Migration Easements: How Conservation Easements and Rivers Can Work Together

As described above, conservation easements are designed to preserve open spaces and natural habitats. Channel Migration Easements are a form of conservation easement where the landowner sells or donates their right to modify a river's ability to migrate or access its floodplain; thereby allowing the natural processes of processes of erosion and deposition to continue in perpetuity. While most landowners along rivers share a genuine respect for their river, allowing erosion to continue unchecked is an intimidating prospect: watching their land, crops, or even homes erode away is nightmarish. Fortunately, CMEs are designed carefully and flexibly to give the river room to roam within the historic channel migration zone, but landowners set the boundaries. Prior to implementing a CME, landowners are provided channel migration zone maps, indicating what parts of their property are more subject to erosion and deposition over time. These channel migration zones have been mapped for many of Montana's major rivers (Figure B-1, Appendix B).

Typically, a landowner wishing to grant a CME uses these channel migration zone maps to help identify the parts of its property it is willing to expose to erosion. They then work with their conservation partners and land trust to craft a migration zone easement boundary. The CME option is especially attractive to landowners who wish not to spend up to hundreds of thousands of dollars to install riprap, and risk losing that riprap in a high flood event, but instead receive compensation for lost land either through a direct cash payment or through tax deductions for a donated conservation easement (Kellogg 2016). In summary, CMEs provide a proactive means of maintaining river and floodplain function while reducing long-term costs of erosion control and loss of natural flood storage. CMEs also serve to remediate those impacts, especially if they are applied in conjunction with active stream restoration work.

3.4 Land Trusts

A land trust is a private, independent nonprofit organization specializing in conservation of private lands in close cooperation with landowners. Land trusts develop and hold conservation easements. There are currently 12 land trusts in Montana, operating at various scales from local (e.g. Gallatin Valley Land Trust, Prickly Pear Land Trust), to statewide (Montana Land Reliance), or regional and national (e.g. The Nature Conservancy, The Trust for Public Land). A land trust holds the Channel Migration Easement and assumes responsibility for monitoring the terms of the easement in perpetuity. The land trust will also take corrective action to protect the conservation values of the property if the terms of the easement are violated. The role of land trusts are discussed in greater detail in Appendix C.

3.5 Conservation Partnerships

Private lands conservation is a critical component of preserving Montana's open spaces and wildlife habitats. To date, Montana's twelve land trusts have preserved over 2.5 million acres of land (Marx 2017). Private landowners contribute significantly to conservation on their own as well as in partnership with technical experts from the private sector, state and federal agencies, and conservation organizations. For complex conservation practices like conservation easements and CMEs, partnerships are critical to success. While land trusts are experts at developing, implementing and monitoring conservation easements, they often rely on conservation partners to maximize their effectiveness. Myriad conservation organizations work around Montana and across the country building relationships with landowners, providing technical advice, and developing restoration and conservation projects.

MARS is an example of a conservation organization through which land trusts can leverage their conservation impact. MARS specializes in aquatic resource mitigation, where those causing damage to wetlands and streams can fund restoration to compensate for their impacts. Channel Migration Easements were envisioned as a practice that could mitigate for actions that armored streambanks for transportation infrastructure, or for industrial accidents. In those cases, MARS developed funding packages, identified potential easement locations, and opened discussions with interested landowners. Once the individual easement projects took shape, land trust professionals were engaged to organize the specifics of the easement and bring the projects to fruition. Creating conservation easements require, at minimum, a willing landowner and a land trust, but conservation partners often bring expertise, funding, and creativity to maximize effectiveness of a project.

4 CMEs as Mitigation for Impacts to Streams and Wetlands

MARS is Montana's In-Lieu Fee (ILF) provider of stream and wetland mitigation credits. ILF programs were codified in the 2008 Final Rule and allow permittees to buy compensatory mitigation credits for unavoidable impacts to Waters of the United States under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

In 2014, MARS began coordinating with the Montana regulatory office of the U.S. Army Corps of Engineers on the use of ILF funds to purchase a Channel Migration Easement in the Middle Yellowstone Watershed. In 2017, the USACE approved a CME that will satisfy MARS' stream credit obligations for the Middle Yellowstone Watershed. This is a significant step in the evolution of compensatory mitigation; it signals that regulators recognize the value of passive land conservation tools to achieve large landscape conservation at scale. As a result of this advancement in mitigation crediting, MARS intends to utilize CME's to offset future, unavoidable impacts to wetlands and streams as permitted by the Army Corps.

Compensatory wetland and stream mitigation are not the only potential funding source for CME's. Natural Resource Damages, threatened or endangered species (e.g., sage grouse), and developing markets including carbon, nutrients, and groundwater banking may be a future source of funding for CME's.

4.1 Credit Calculations

If a CME is part of a compensatory mitigation project or will satisfy another form of mitigation (e.g., Natural Resource Damages from the Yellowstone River oil spill), the ecological value of the project should be articulated using quantitative metrics to estimate the impacts it is compensating for. One available method is the Army Corps of Engineers Montana Stream Mitigation Procedure (MTSMP) (USACE 2013). This method contains ten credit factors, including the preservation of riparian buffer. The MTSMP assigns a multiplier to the buffer width that will be preserved in perpetuity through a conservation easement (or deed restriction), and therefore a Channel Migration Easement is capable of generating a quantifiable number of mitigation credits using this tool.

4.2 Monitoring Approaches

As stated above, CME's can be a form of compensatory mitigation and therefore there may be elements of the conservation easement that require monitoring (in addition to the traditional annual conservation easement compliance monitoring). At this early stage in executing Channel Migration Easements for compensatory mitigation, we recommend qualitative monitoring methods to study the changes in the river channel over time rather than define the success of a Channel Migration Easement by natural successional processes that are difficult to predict or control. Instead, rapid assessments that capture signs of channel equilibrium, channel aggradation, or channel degradation may strike the right balance between scientific rigor and no monitoring whatsoever. Ultimately, we should define success as a stretch of wild river that is unconfined by armor, levees and dikes, flow deflectors, or other manmade features that alter the river's ability to freely migrate and access its floodplain.

5 Summary and FAQ's

Q: *What are CME's?*
A: *Channel Migration Easements are a type of conservation easement that transfers the property right of a landowner to channelize, harden, rip-rap, or stabilize the bankline and historical Channel Migration Zone in perpetuity in exchange for financial compensation. The landowner still maintains ownership of the land and retains all of the other property rights that are not explicitly limited in the easement. The purpose of a CME is to protect the river's ability to move freely across its floodplain and allow it to adjust to changes in hydrology and bed load with erosional and depositional processes.*

Q: *How are the boundaries of CME's determined?*
A: *CME boundaries are based on the Channel Migration Zone, a corridor that represents the most likely places that a large river will migrate based on the past 100 years. A CME boundary may include areas outside of the Channel Migration Zone, but this determination is based on the size and shape of the parcel, the available funding for purchasing the easement, and the land trust holding the easement.*

Q: *Can CME's be donated or are they always purchased?*
A: *Yes, CME's can be donated and in exchange, the landowner may be eligible for a tax deduction based on the value the property has depreciated as a result of extinguishing certain rights (primarily, the right to subdivision). However, if the easement is donated, often the entire parcel must be placed under easement (e.g., it is not recommended that the landowner consider subdividing land and donating only the Channel Migration Zone). If purchased, non-profit organizations and agencies are restricted to paying no more than Fair Market Value of the easement, which is based on a qualified conservation easement appraisal.*

Q: *The river has changed the shape of my property – how do I know what I still own, and what belongs to the state?*
A: *The state of Montana owns the bed, banks, and land below the ordinary high water mark of navigable rivers. That means that islands that have arisen out of the bed of the river over time through vertical accretion belong to the state. However, if the river avulsed (changed course abruptly) and cut off a piece of your land in the process, it may still belong to you. It is best to hire an attorney and seek the advice of a geomorphologist who can analyze a series of aerial imagery and give you an opinion. Appendix A: Legal Considerations of CME's provides more detailed information.*

Q: *How long will it take to complete a CME on my property?*
A: *This depends a number of factors including funding and on whether a Quiet Title Action is required (if the shape of your property has changed quite a bit then it is best practice to hire an attorney and establish certainty around landownership). It usually takes at least 9-12 months for an appraisal, survey, baseline documentation report, and any other requirements the land trust may have (e.g., survey for environmental hazards, investigate mineral rights).*

Q*: What if there are bridges or roads in the CMZ?*
A*: MARS believes it is best practice to communicate with county planners, city officials, and transportation agencies early and often to address concerns related to maintaining infrastructure (e.g., ensuring the road right-of-way is outside the easement boundary).*

Q*: If I do a CME, is public access required?*
A*: No, not unless you want to build that into your easement. Typically, public access is a negotiable part of a conservation easement (although some funding sources and easement holders require it, such as Montana Fish Wildlife and Parks.*

Q*: How long will it take to complete a CME?*
A*: This depends on a number of factors, including: whether the funding is readily available (e.g., sometimes it takes time to get required approvals if the project is using compensatory mitigation funds), which land trust or public agency is going to hold your easement (and what their due diligence requirements are), whether you need to do a Quiet Title Action, and how soon an easement appraiser can be available to determine the value of the easement, and whether you need to subordinate loans you have on the mortgage. It's safe to assume it will take at least a year.*

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Appendix A

Legal Considerations of Channel Migration Easements

Appendix A: Legal Consideration of CMEs

As described above, conservation easements and CME's are created by law to conserve open space and natural habitats, especially along rivers. This section describes some considerations in state and federal law that regulate easements, especially along rivers. Property law can be complex, and creating a conservation easement requires many legal considerations.

Conservation Easement Law is State Law

In the United States, laws governing real property are primarily reserved to the states. While most states' bodies of property law share fundamental principles in common, each state has its unique twist of law reflecting the quirks and culture of its people. In the late 1960's and early 1970's, Montanans awakened to the destruction of their air, water and landscapes and adopted a new state constitution mandating protection of a "clean and healthful environment." Following the new constitution, Montanans passed new laws protecting water quality, air quality, water uses, and wildlife conservation and management. One such law was the 1975 "Open-Space Land and Voluntary Conservation Easement Act" (Mont. Code Ann. §§76-6-101 *et seq.*) The bill was in part a reaction to a proposal in the U.S. Congress to declare the Big Blackfoot River as a Wild and Scenic River, which would have imposed federal restrictions on portions of the river running through federal lands. Landowners against federal meddling, but in favor of conservation, worked to create a "viable methodology to effect (land) protection through private contract, enforceable in Montana as vested real property interests" (Knight 2014).

Montana's focus on the private, contractual nature of conservation easements is different than other states' approaches (Morrisette 2001). In Montana, a private landowner voluntarily grants an easement to a qualified third party interest – either a land trust or government agency – to create the conservation easements. Enforcement of the easement is up to the easement holder. In other states, the Attorneys General have the authority to enforce conservation easements as part of their charitable trust enforcement duties. Almost half the states have adopted a Uniform Conservation Easement Act, which is a consistent set of conservation easement laws shared by all adopting states.

While conservation easement laws have similar characteristics across the U.S., it is important to recognize the legal constraints within the state in which an easement project is sited. While conservation easements are created under state law, federal law—especially tax law—may have an impact on a project.

Purchased or donated easements, tax law and conservation

Creating a conservation easement like a CME is a complex transaction in real property, which has both monetary and tax implications. When a landowner grants a conservation easement to a land trust, the property rights it conveys have value. For example, if a landowner gives up the right to subdivide its property in a conservation easement, the landowner may be sacrificing a considerable amount of its property value. That property value can be significant. Landowners certainly derive a personal benefit from knowing conservation values will be preserved in perpetuity. However, landowners can also receive an economic benefit from a conservation easement in the form of direct payments or through a federal tax deduction for a charitable contribution.

Typically, a conservation easement is valued by a licensed appraiser, who determines the economic value of real property before and after the easement is created. The difference in value is considered the dollar value of a conservation easement. In some cases, an agency, land trust, or non-profit conservation organization will make a cash payment negotiated with a landowner. A wide variety of state, federal, and private funding sources are available to pay for conservation easements. Sometimes, the easement value is realized for the landowner through a "bargain sale," where the landowner accepts a payment less than the full value of the easement, thereby donating the remainder (the donation is tax-deductible). Alternately, the value of a conservation easement can be donated in total to an agency or non-profit organization. Permanent donations of real-property interests are tax deductible under §170(h) of the U.S. tax code. A landowner can seek a charitable deduction for qualified conservation contributions, including contributions of a qualified real property interest to a qualified organization exclusively for conservation purposes (IRC § 170(h)(1)). A qualified real property interest includes or an easement that restricts the use of the property in perpetuity for conservation purposes including outdoor recreation or education of the general public, protecting natural habitats, preserving open space or scenery or preserving a historically important land area or historic structure (IRC § 170(h)(4)).

Clearly, states and the federal government recognize the importance of conservation and that thoughtful stewardship can become a useful and valuable asset for a private landowner. The next section describes how property ownership and value can be complicated when a river runs through it.

Navigable Water Doctrine – property boundaries of "navigable waters" shift with the river

As described above, the ever-changing nature of rivers creates a bounty of resources along with complications for public and private riparian landowners. Property law is complex, having evolved from the *Magna Carta* into modern times under the concept that firm boundaries between ownerships minimize tensions between neighboring land owners. However, the systems employed to measure boundaries—typically metes and bounds or Township/Range/Section legal land descriptions—does not adequately capture transient property boundaries, especially along perpetually changing rivers or tidewaters. Simply put, property boundaries along navigable waters migrate with the waters.

Early in the history of the United States, navigable rivers, lakes, tidelands, and harbors – the Waters of the United States -were recognized as channels of commerce, held in trust by the King (and later by the U.S. government) for the people to use to freely transport trade goods or to travel among the colonies, states, and territories, not to be impeded by states or private individuals under the commerce clause of the U.S. Constitution (Pollard vs. Hagen 44 U.S. 212 (1845)). As the United States expanded westward and new states joined the Union, the states were granted ownership of certain public lands (commonly school trust lands) including the bed and banks of navigable streams, shorelands, and tidelands. This so-called Public Trust Doctrine ensured that new states could be placed on equal footing with the original colonies, which had inherited those public lands as a result of their breakaway from the United Kingdom. Importantly, the federal government retained authority over the waterway itself to ensure interstate commerce along navigable waters was not obstructed.

Early U.S. surveyors mapped out the sinuous pathways of major rivers to determine the locations of the beds and banks of navigable streams. At statehood, states took ownership within the mapped-out channels, including islands, up to the low water mark. Where rivers transected one square mile sections of the more orderly grid called the public land survey system, the odd polygons along rivers were divided into irregularly shaped government lots. As parcels of the federal public lands were transferred to private ownership through various homestead acts of Congress, riparian government lots became irregular privately-owned homesteads subject to the shifting boundaries of navigable waters that moved under the constant processes of erosion and deposition.

A body of law evolved to address the shifting boundaries of riparian lands and water. The law recognized the essential fluvial processes of erosion, accretion, and avulsion. First, as a river erodes into riparian land the property boundary shifts as the banks are eroded away. A riparian landowner on the erosional bank loses land, while on the depositional side of the river, where gravels pile up gradually, or accrete along banks, the riparian landowner gains land. Rivers also change pathways through a sudden process called avulsion. Where a river suddenly erodes a new channel across its floodplains through the process of avulsion, property boundaries do not change. The island left behind after an avulsion, remains the property of the riparian landowner. In contrast, a new island emerging from the river channel itself, and not by accretion to a river bank, remains the property of the state.

The shifting nature of property boundaries along navigable waters complicates creation of conservation easements like Channel Migration Easements. When a landowner decides to create a conservation easement on riparian property, the boundaries of the property subject to conservation easement must be redefined to ensure the land trust knows exactly what real property they are acquiring. Along navigable streams, property boundaries are likely to have changed since the parcel was last surveyed and recorded. Redefining property boundaries along rivers typically requires a new survey, to identify the existing low-water mark that delineates the boundary between the upland property and the state-owned river channel. Along with a survey, a review of historic aerial photographs tells the tale of a property, from when the pioneering surveyors first meandered the river to modern times. Once the evidence is gathered and analyzed for erosion, accretion, and avulsion, property boundaries can be reset. The legal process is called a quiet title action, which requires a state judge to apply the law of navigable waters to the evidence and rule on where the new boundaries are located. As administrator of Montana's state trust lands, including beds of navigable waters, the Department of Natural Resources and Conservation must weigh in to defend the state's interests in property within the river channel.

Every Channel Migration Easement is different. Only those conservation easements bordering navigable rivers will necessarily involve a boundary realignment and only those projects in highly active reaches of river are likely to require a quiet title action. In Montana, the state considers the following major rivers navigable waters: the Yellowstone River from Emigrant to North Dakota, the Missouri River from the headwaters to North Dakota border, and the Kootenai River from the Canada border to the Idaho border.

Local planning involvement

As described above, state law regulates private property. Most states delegate the regulation of land uses to County governments, who engage in land use planning like zoning and subdivision. County planning offices and boards of adjustment are generally charged with reviewing applications for subdivisions and shifts in land uses. Conservation easements often create significant restrictions on land use, which could affect landowners and the county. To ensure that county officials are aware of conservation easement, Montana's Open-Space Land and Voluntary Conservation Easement Act requires that proponents of a conservation easement inform county planning officials of the potential easement. County officials have 90 days to submit non-binding, advisory comments regarding how the conservation easement might affect its planning efforts. After the comment period, the deed of conservation easement may be recorded with the County Clerk.

Determining the CME Footprint

As discussed above, a property that is located along a large river system and has a portion of the property in Channel Migration Zone ("CMZ") is a candidate for long-term protection through deed restriction or conservation easement. Although it would be most cost effective to place an easement solely on the CMZ, it is not always feasible to do so. When easements are donated, the landowner receives a tax deduction based on the amount of depreciation in value that occurs as a result of selling the development (or other) rights.

The IRS scrutinizes landowners who donate easements and the non-profits that hold them. A donated easement appraisal will be more comprehensive and value the adjacent parcels of land surrounding the easement if they are owned by members of the same family. Purchased easements, on the other hand, do not face the same type of IRS scrutiny and appraisals will only value the conservation easement project itself. From the perspective of a land trust, large parcels with high conservation value are prioritized because land trusts are usually interested in spending limited time and resources in the most effective way possible. One way to prioritize CME sites from a feasibility perspective is by selecting properties that are both large in size and have a large proportion of the property located inside the CMZ (see Figure A-1).

Some landowners may want to consider deed restrictions, which are discussed above. In other situations, mitigation funds or Natural Resource Damage settlements may be available to purchase easements or acquire land in the CMZ. The best course of action depends on the goals and time horizon that is desired by the parties involved, and also on the types of land use and habitats on the property.

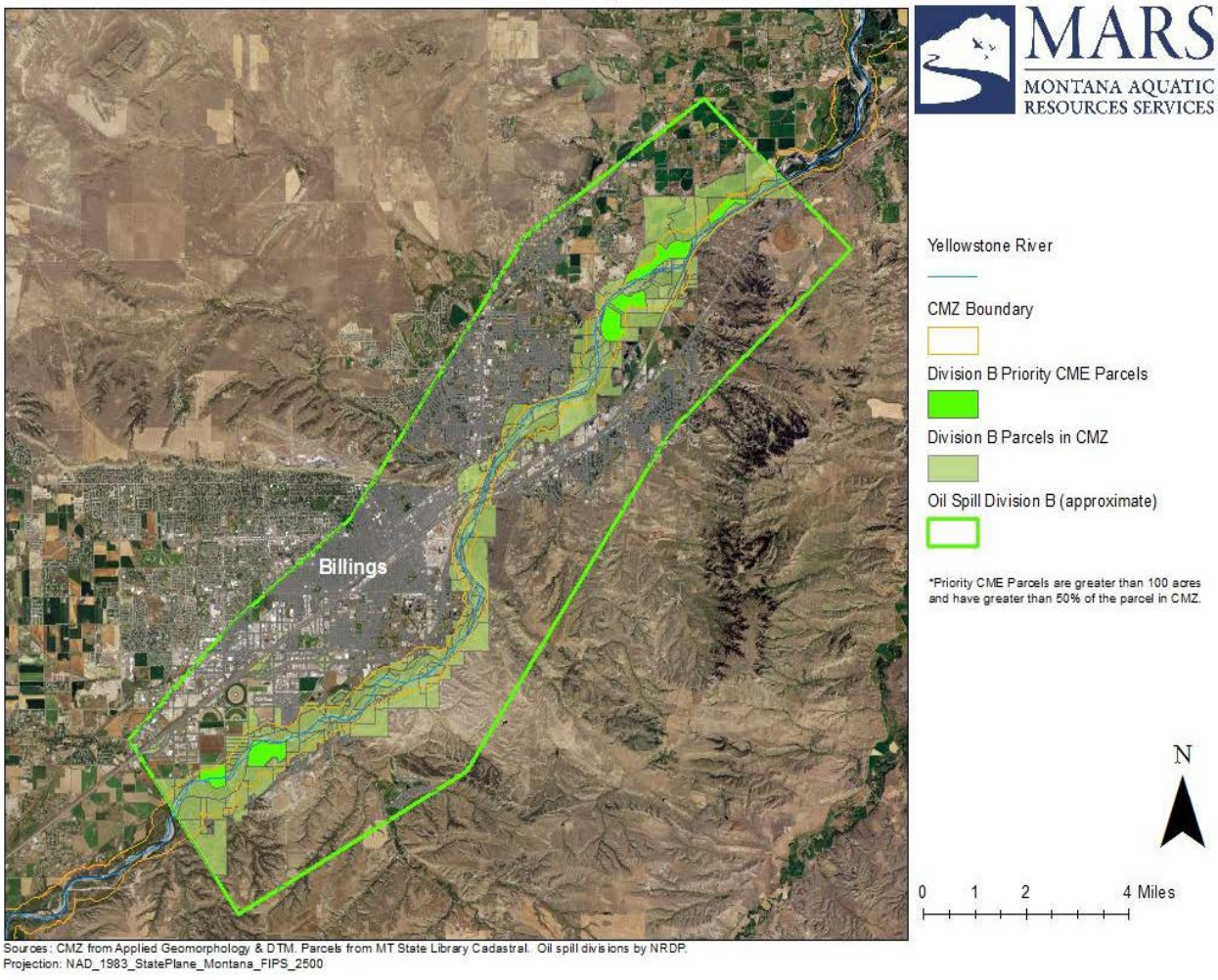

Figure A-1. Hypothetical example of priority CMEs showing all of the parcels (green polygons) that intersect the CMZ (orange line) around Billings, Montana. A subset of parcels (bright green polygons) have been selected as having high feasibility because they are larger than 100 acres and have greater than 50% of their parcel boundary in the CMZ.

Appendix B: Technical Considerations of CMEs

Channel Migration Easements are intended to help stakeholders manage rivers as dynamic stream corridors and thereby support sustainable ecological function in stream channel, riparian, and floodplain areas. They inherently require the delineation of some sort of boundary that will provide an appropriate level of stream function by allowing unimpeded river movement. Defining that boundary may involve multiple considerations, such as economics, politics, infrastructure considerations, and the nature of channel dynamics. This section describes technical aspects of CME delineations as they relate to stream dynamics and constraints associated with infrastructure and land uses.

Mapping Channel Migration Zones

Channel Migration Easements are generally developed using the Channel Migration Zone (CMZ) concept, which is based on the understanding that rivers are dynamic and move laterally across their floodplains through time. As such, over a given timeframe, rivers occupy a corridor area whose width is dependent on rates of channel shift. The processes associated with channel movement include lateral channel migration and more rapid channel avulsion which are discussed in Section 2. The following section describes the process for developing Channel Migration Zone maps.

The fundamental approach to CMZ mapping is to identify the corridor area that a stream channel or series of stream channels can be expected to occupy over a given timeframe – typically 100 years (Rapp and Abbe 2003). This is defined by first mapping historic channel locations to define the Historic Migration Zone, or HMZ. Historic rates of channel movement are then measured between suites of air photos, which allows the calculation of migration rate (feet per year) at any site. Average annual migration rates are calculated on a site or reach scale and extended to the life of the CMZ. This 100-year mean migration distance defines the Erosion Buffer, which is added to the modern bankline to define the Erosion Hazard Area, or EHA.

Channel migration rates are affected by local geomorphic conditions such as geology, channel type, stream size, flow patterns, slope, bank materials, and land use. For example, an unconfined meandering channel with high sediment loads would have higher migration rates than a geologically confined channel flowing through a bedrock canyon. To address this natural variability, streams are typically segmented into a series of reaches that are geomorphically similar and can be characterized by average migration rates. Reach breaks can be defined by changes in flow or sediment loads at tributary confluences, changes in geologic confinement, or changes in stream pattern. Within any given reach, dozens to hundreds of migration measurements may be collected.

Avulsion-prone areas are mapped where there is evidence of geomorphic conditions that are amenable to new channel formation on the floodplain. This would include meander cores prone to cutoff historic side channels that may reactivate, and areas where the modern channel is perched above its floodplain.

The following map units collectively define a Channel Migration Zone (Rapp and Abbe, 2003):

- Historic Migration Zone (HMZ) – the area of historic channel occupation, usually defined by the available photographic record.

- Erosion Hazard Area (EHA) – the area outside the HMZ susceptible to channel occupation due to channel migration.
- Avulsion Hazard Zone (AHZ) – floodplain areas geomorphically susceptible to abrupt channel relocation.
- Restricted Migration Area (RMA)-- areas of CMZ isolated from the current river channel by constructed bank and floodplain protection features. The RMA has been referred to in other studies as the DMA- Disconnected Migration Area.

The individual map units comprising the CMZ are as follows:

$$CMZ = HMZ + EHA + AHZ$$

The Restricted Migration Area (RMA) is commonly removed from the CMZ to show areas that are "no longer accessible" by the river (Rapp and Abbe, 2003). Commonly, the areas of the natural CMZ that have become isolated are contained within the overall CMZ boundary and highlighted as "restricted" within the natural CMZ footprint.

Each map unit listed above is individually identified on the maps to show the basis for including any given area in the CMZ footprint (Figure B-1).

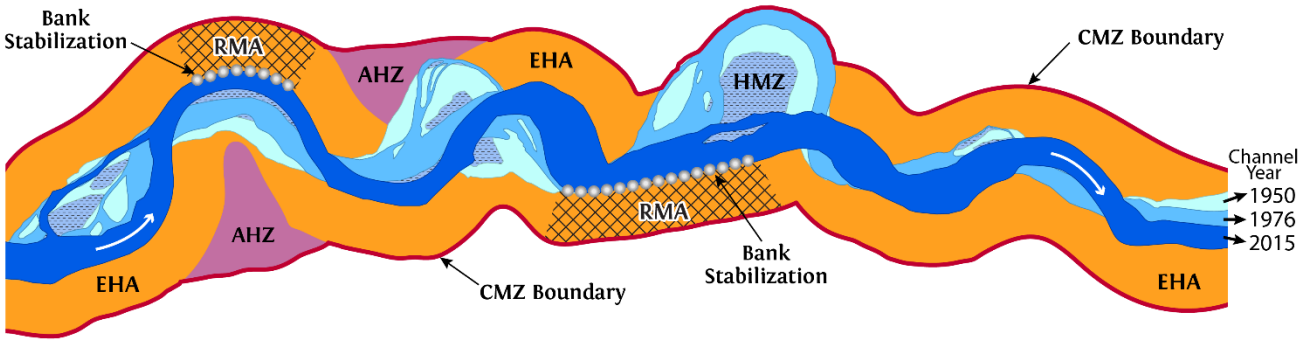

Figure B-1. Channel Migration Zone mapping units.

Selection of CME Sites

The selection of CME sites is a function of the overall goal of the project. In some cases, the objective may be to recruit large wood to the river in the short-term. In this case, the site selection may focus on areas of active bendway movement into riparian forest. In other locations, sites may focus on the reduction of risk associated with river corridor development. In these cases, areas at highest risk of short-term erosion may be identified for the CME footprint. Long-term CMEs are geared towards just that; protection of river bottom areas that will allow for unimpeded stream movement regardless of short-term issues.

Constraints: transportation, agricultural, infrastructure

CMZ's often abut infrastructure such as roads or railroads, altered or developed land, or berms and levees that have been constructed to allow farming or ranching activities. These areas, described above as Restricted Migration Zones, truncate the historic CMZ due to human intervention and manipulation, which means that they may be vulnerable to erosion, destabilization, and flooding in the future if the river migrates within its historic migration zone.

Channel Migration Easements should be cognizant of the places where Restricted Migration Zones intersect transportation infrastructure. Land trusts, landowners, and third parties (e.g., MARS) should discuss potential risks to public infrastructure and may consider delineating and excluding a right-of-way that would allow the public utility or agency to conduct bank stabilization activities for the public good.

Appendix C

General Procedures for Developing a Channel Migration Easement

Appendix C: Steps to Creating a CME

The process to establish a channel migration easement includes: landowner engagement, due diligence, easement and land appraisal, developing and finalizing easement terms, agency review and approval, and landowner acceptance. Channel migration easements may include a fundraising stage, depending on the landowner's willingness to donate the easement for tax purposes. The process concludes with the full execution of a final purchase and sale agreement, closing the transaction, and recording of the conservation easement on the property title. Of course, the first step in the development of a CME is identifying candidate properties that can, and property owners that are willing, to support a CME.

The following subsections provide a more definitive summary of the process required to identify and establish a CME.

Project Development

Project development begins with the identification of the CMZ. This can be done as a part of a larger CMZ mapping project, such as has been performed on the Ruby, Flathead and Yellowstone Rivers, or as a more localized reach or property CMZ mapping. The approach taken is dependent on the situation. In areas where large-scale streambank mitigation is required, such as along the lower Yellowstone, the CME program will benefit from broad-scale mapping of the entire river segment. Where individual property owners are willing to establish a CME on their property for conservation purposes, a more localized approach that provides reach-based CMZ may be the appropriate mapping extent.

Regardless of scope, initial project development requires two types of mapping data: property ownership information identifying parcel boundaries, and CMZ mapping to estimate the extent of the CME. Parcel information is most often available through county tax assessor records, or through the Montana Spatial Data Infrastructure Cadastral framework[5]. Many counties have developed GIS-based record systems that allow the public to geospatially identify land parcels and ownership. If tax assessor parcel data is not readily available, it may be necessary for the easement acquisition agency to visit the area and knock on doors, although this can result in negative reaction from landowners and misconceptions that a CME is a government taking.

GIS datasets for mapped CMZs in the State of Montana can be obtained through the Montana State Library (MSL)[6]:

- Big Hole River (2005)
- Clark Fork River - Bitterroot to Huson (2009)
- Clark Fork River - Plains Area (2014)
- Flathead River - Old Steel Bridge to Flathead Lake (2010)
- Prickly Pear and Lower Tenmile Creeks (2011)
- Lower Ruby River (2010)
- Yellowstone River (2009)

In addition to geodatasets, the site also includes downloadable pdf maps, reports and web-based mapping. The MSL CMZ site includes an interactive map of CMZs in the state. The site provides additional information regarding risk and uncertainty, GIS data deliverables for channel migration mapping studies, guidelines and best practices (to be developed), useful products and potential applications, contacts and resources.

For other areas where CMZs have not been mapped, it will be necessary to develop this data to identify properties that have the potential for establishing a CME.

[5] Accessible at: http://svc.mt.gov/msl/mtcadastral/
[6] Data available at: http://geoinfo.msl.mt.gov/data/montana_channel_migration_zones/data_maps_and_reports.aspx

Project Identification—Screening Level

Identification of a potential CME project begins with identifying parcels that contain a CMZ that can satisfy the specific project objectives listed above. Occasionally a CME project is created to satisfy a regulatory mandate, such as in-lieu fee mitigation or injury resulting from Natural Resource Damage claims.

Screening criteria depend on the project goals, funding source, and the geographic scope of the effort. General criteria may include the following:

- Size of parcel
- Size of CMZ and proportion of CMZ in parcel
- Land use in CMZ
- Land value
- Lateral bank migration rate
- Habitat such as riparian forest
- Additional restoration opportunities (e.g., invasive species removal, side channel blockages)

Landowner Outreach

After screening projects for feasibility, initial contact with landowners can be performed via a letter that explains CMEs, the potential for a CME on the property and the process required for obtaining a CME. Mapping of CMZs and the acquisition of CMEs are complex processes and may be difficult for property owners to understand; therefore, the challenge of the initial contact letter is to explain these issues in simple language that avoids technical jargon.

In addition, the letter should always clearly explain that the development and acquisition of a CME is purely at the discretion and consent of the landowner, and never an act of seizure (i.e., eminent domain) or by imposition of regulations that limit or prohibit use. Experience indicates that many property owners immediately negatively conclude that a CME is a government taking. In addition, land brokers often become aware of CME activity and will attempt to get landowners to enter an agreement to have the land broker represent them in CME acquisition negotiations. Although such representation is not unethical or illegal, it often can lead to landowner misperceptions and land broker requirements that will increase the complexity, cost and schedule for easement acquisition. In addition, others opposed to any kind of public “infringement” on property rights may attempt to derail the CME process through the dissemination of misinformation that causes the property owner(s) to decide against providing an easement. Therefore, initial contact with property owners should be performed in a discrete manner that does not divulge any confidential property owner information, even if such information is public domain. It is the decision of the property owner to contact and enter an agreement with a land broker and, if such happens, then the agency can decide to proceed with negotiations with the broker or break off contact.

Often local support for a project that includes the need to acquire several easements to meet mitigation requirements can be established through dialogue with Soil and Water Conservation Districts (SWCDs). Support of SWCDs can be critical to developing a successful CME program in a watershed. However, some districts can be very resistant to CMEs for purely philosophical reasons that such easements appear to increase government control over local resources, despite the fact that the landowner has sole authority to enter into a CME. Other local/regional governmental or quasi-governmental entities can be approached in attempt to garner support for a CME program. Local governments often can be resistant to CMEs as they believe that such an easement will hamper their ability to improve, modify or protect infrastructure such as roads, bridges and culverts or irrigation diversions. It needs to be made clear that a CME in no way limits the ability to use the land as it has been used or to provide services relate to the improvement or protection of public or private infrastructure. Therefore, these local governments (municipalities and counties), quasi-public agencies (irrigation districts,

SWCDs and water providers) or private entities (irrigators, ranchers) need to be informed of the requirements and benefits of CMEs.

Land Trust Partners

CMEs are usually developed in partnership with a land trust. There are 12 recognized land trusts operating in the State of Montana:

- Prickly Pear Land Trust, Helena
- Gallatin Valley Land Trust, Bozeman
- The Trust for Public Land, Bozeman
- Flathead Land Trust, Kalispell
- Montana Land Reliance, Helena
- Five Valleys Land Trust, Missoula
- Bitter Root Land Trust, Hamilton
- The Conservation Fund, Missoula
- Rocky Mountain Elk Foundation, Missoula
- The Vital Ground Foundation, Missoula
- The Nature Conservancy of Montana, Helena
- Kaniksu Land Trust, Sandpoint (ID)

These land trusts work collaboratively under the umbrella of the Montana Association of Land Trusts (MALT). MALT's mission *is to promote and support excellence in private voluntary land conservation in Montana through leadership, collaboration, education and outreach*[7]. Land trusts are nonprofit organizations that partner with landowners to preserve and conserve the natural conditions and characteristics of private lands. Land trusts work closely with farmers and ranchers, county governments, state and federal land and wildlife management agencies, local watershed groups and others. Land trusts collaborate on a voluntary basis with landowners to negotiate and execute agreements that protect the land from future industrial, commercial or residential development.

Preliminary Landowner Agreement – Letter of Agreement

Once the landowner has agreed to negotiate a CME, it is helpful to develop and execute a preliminary agreement to begin the CME process. A Letter of Agreement can be a useful vehicle to outline the general terms of the CME as well as anticipated roles and responsibilities of the CME acquirer (the landowner) and the CME holder (participating land trust or agency). The Letter of Agreement can outline specific due diligence requirements (including a qualified appraisal), timeline, and schedule. CME's require that both landowner and land trust or agency commit resources to the project, and the Letter of Agreement formalizes this commitment.

Some land trusts require a Purchase & Sale Agreement, and establish an escrow fund for the property, held by a third party. In addition to encumbering funds based on a preliminary assessment of the conservation value of the land the escrow fund provides an additional level of confidence for both the landowner and land trust. In addition, fees associated with various technical services and specialists, such as a land surveyor, title company and appraiser, should be placed in escrow. Upon final approval and closing of the purchase agreement, the remaining escrow fund is used to pay the purchase price of the CME.

Reconnaissance Level Mitigation Potential (if applicable)

Once the preliminary agreement has been executed, an initial site assessment should be performed including representatives of both the acquisition agency and the landowner. The intent of this initial site reconnaissance is multi-fold:

[7] Montana Association of Land Trusts. Source: http://www.montanalandtrusts.org/

- A qualitative identification of site characteristics and conditions that will impact CME value. If the property is to be donated for tax benefits, this reconnaissance should include an assessment that the CME features meet Internal Revenue Service requirements of having a "conservation purpose."
- The acquiring land trust should identify any future uses the landowner may be planning that could impact the CME, such as habitat or agricultural enhancement, reservation of future building sites or recreational improvements. A determination needs to be made that sufficient room is available for future planned activities can occur on the portion of the property unencumbered by the CME. Planned building/structural development activities should occur outside of the proposed CME. This is not a requirement, but the landowner must be made aware that if future building/structural development occurs, it cannot be protected from encroachment by the river channel. Landowner plans to develop land within the CME should be strongly discouraged and can be prohibited by the terms of the final agreement.
- Other rights the landowner would like to retain should also be identified at this time. Such rights may include maintenance of existing roads or trails, agricultural production or maintenance of water supply features or recreational amenities.
- Identification of possible site enhancements that may be required to physically establish a CME. Such enhancements may include such actions as removal of bank armoring (riprap, concrete debris, old autos or other debris placed on the river bank), recontouring of the channel bank, revegetation, removal of trash and debris within the CME that poses a hazard should it become waterborne.

The initial site reconnaissance is not only an opportunity to develop an initial characterization of site opportunities and constraints and identify landowner intent, but also helps to further develop a collaborative relationship between the acquiring agency and the landowner, deepening the level of trust between the two parties. This is an important aspect of the acquisition process for both parties, particularly as the process proceeds into the negotiation phase. A trusting and positive personal relationship will reduce the stress associated with negotiating costs and easement restrictions.

Cost Estimate for Executing the Channel Migration Easement

Once an initial site reconnaissance has been performed, an initial cost estimate can be performed that includes CME acquisition and enhancement costs. Some of this work will have been performed prior to execution of the preliminary agreement so that an escrow fund can be set up. This estimate should be a refinement of the opinion of cost with detailed itemization of costs.

Costs associated with the identified components should be based on recent conservation easement transactions and requirements within the county (if such data is available), real estate market trends, and, the best professional judgment of the acquiring agency or land trust. Cost items that should be included in this estimate, and are dependent on land trust requirements, are:

- Legal fees: for development and acquisition of the CME.
- Title work: standard title search of the property to identify any liens and/or financial encumbrances, such as one or more mortgages. If mortgage(s) exist, the mortgage holder(s) need to be willing to take a subordinate role by signing a mortgage subordination document that allows the easement to survive a foreclosure of the mortgage.
- Property and CME boundary surveys: The CME boundary needs to be established in the field, by a licensed land surveyor who will supply a certified metes and bounds description of the CME. The boundary survey is also necessary for any Quiet Title Action proceedings (see Due Diligence: Verifying the CME Footprint).
- Mineral and water rights reports: identification of reserved mineral and water rights that could impact the CME if they are exercised. If the landowner does not own mineral rights, a professional geologist may be required to issue a mineral remoteness report.

- Phase 1 Environmental Site Assessment: if the initial site reconnaissance presents evidence of prior commercial, industrial or agricultural use that could have resulted in potential contaminations, a Phase 1 ESA should be performed to confirm or disprove the existence of hazardous materials or contaminants.
- Biological baseline inventory: a characterization of plant and wildlife communities within the CME.
- Appraisal: land value appraisal to be performed by a certified appraiser with expertise in conservation easements.
- Stewardship and legal defense contribution: payment to the land trust to take on CME monitoring and management responsibility in perpetuity.
- Land cost (CME land value): a per acre cost expected to be paid to the landowner for the right to place the CME on their property, generally less than 40% of fair market value of land.
- Closing Costs.
- Additional funds should be set aside in escrow for the monitoring and management fees that will be paid to the land trust, upon close, to hold the easement in perpetuity.

Land cost can vary depending on several factors:

- Whether the CME is already under a separate conservation easement (CE). Although the land may be protected by an existing CE, it may not be protected to the extent provided by a CME, due to the distinct purposes a CE (i.e., land conservation) as opposed to a CME (i.e., maintaining natural streambanks and migration zones). The incentive cost can vary depending on the extent and restrictions associated with the existing CE.
- Whether the CME purchased or donated by the landowner, which may provide federal tax benefits. The landowner may qualify for a federal charitable income tax deduction if the CME transaction meets the requirements of the Internal Revenue Code section 170(h). These requirements include conveying the easement to a qualified organization exclusively for conservation purposes and in perpetuity, typically a land trust.
- Some CMEs can include a buffer zone on which use restrictions are lesser than in the CMZ. Because of this, incentive payment in the buffer zone can vary from that in the CME.

As discussed, an initial estimate of costs will need to be developed upon identification of a likely property candidate for establishment of a CME. This estimate is generally high level, based on past costs for similar properties and a basis for establishment of an escrow fund. Once the preliminary agreement has been executed and further site investigations conducted, a process can be undertaken to refine this high-level estimate and developing estimates for individual costs as identified in this section. Cost refinement should continue throughout the process, relying on site-specific data and information as it is acquired.

It is important to note that the IRS limits the amount of money a 501c3 nonprofit organization or government agency may pay for land. The IRS dictates that land payments may not exceed fair market value. Since the landowner retains ownership and use of the property, the value of the CME is much less than full market value of the land.

Due Diligence

Due diligence is a research process intended to identify any legal, title, environmental and cultural issues that could impact the development of a CME. Due diligence can begin as soon as the landowner signs the preliminary agreement, agreeing to develop a CME. Due diligence findings are summarized in a baseline documentation report. Site-specific information gathered during due diligence forms the basis for the CME acquirer to proceed with CME acquisition efforts or halt the process. Due diligence provides assurances that the property under consideration will be legally compliant with regulations set forth by the regulatory agencies.

Due diligence of CME candidate properties should include reviewing the title, water, and mineral rights on a property before it can be accepted as a conservation easement. In addition, the conservation easement holder must also ensure any liens or encumbrances on the property are released, subordinated, or addressed in such a way that the conservation easement will be preserved in perpetuity.

Due diligence findings require both legal and environmental review. Other aspects of the CME acquisition process can occur simultaneously with due diligence, including negotiating conservation easement terms, identifying permitted or prohibited uses or reserved rights, and establishing monitoring and management terms. However, if performed concurrently these activities may be impacted by due diligence findings and may require modification of negotiated CME terms.

Following are descriptions of items to be taken into consideration during due diligence.

Title Review and Property Liens

The title and legal review process involves preparation and investigation of title documents, mineral, and water rights, and development of a title review findings memorandum. This process will also involve addressing any issues that may be discovered during the review, such as liens on the property or encumbrances. Title documents, as well and mineral and water rights reports, should be prepared by a Montana state accredited title review company.

In addition to a standard property title search, mineral and water rights should be researched and identified. This research should be performed by a professional with specific expertise in these fields. Upon identification of any mineral or water rights, a judgment should be provided by the professional regarding the likelihood that the rights will be exercised.

Once review of title and related documents is complete, the CME acquirer's legal team should produce a title review findings memorandum. This memorandum will provide an explanation of title documents, any issues discovered that could impact the CME process and recommendations addressing these issues, if an insurmountable issue is discovered, a recommendation to end the acquisition process.

Properties that are not owned outright by the landowner require additional decision-making related to the "donation vs. purchase" decisions (see below). If a property has a mortgage, the landowner must approach the bank and ask for a subordination. The bank will work with the landowner to establish a subordination agreement and establish the priority of liens on the property (one of which is the conservation easement). A landowner may choose to pay off outstanding loans with the payment received for an easement, or may choose to subordinate loans with the bank but should make this decision early to avoid conflicts or delays.

Verifying the CME Footprint – Site Boundary Survey & Quiet Title Action

Upon completion of the title search, the CME should be reviewed and verified in the field. This review should include a final determination of the CMZ to be preserved by the easement. As a part of this review, a determination should be made if additional easement outside of the CMZ may be needed based on site conditions. It may be desirable to include additional CME buffer areas to preserve habitat, vegetation or other site features that lie outside of or are only partially located within the mapped CME boundary and would benefit from preservation as a part of the easement.

Due to the dynamic shifting of river channels and riparian habitat, it may be necessary to establish an updated parcel boundary through Quiet Title Action. This is a process that "quiets" any competing, usually dormant, claims to a property. The Montana Code states: "Where from natural causes land forms by imperceptible degrees upon the bank of a river or stream, navigable or not navigable, either by accumulation of material or by the recession of the stream, such land belongs to the owner of the bank, subject to any existing right-of-way over the bank." Mont. Code Ann. Section 70-18-201. In Montana, the Department of Natural Resources and

Conservation is the entity that determines whether the state believes the contested parcel belongs to the state or the landowner and the claim must be approved by the State Land Board. Appendix D provides a case study that describes a specific example where a Quiet Title Action was performed on a CME.

After pursuing Quiet Title Action, a metes and bounds survey is required for both the property and CME boundaries. This survey needs to be performed, sealed and signed by a professional land surveyor registered in the state in which the CME will reside, and recorded at the Clerk and Recorders office. CME corner pins should be established in the field by the surveyor so that the CME can be identified in the future. The CME metes and bounds survey should be compared to the mapped CME footprint, including any additional buffer areas beyond the CME, to ensure that all lands intended to be preserved are located within the legal boundary description.

Site Baseline Inventory

Site inventories are intended to identify and document biological resources, rare species, geology, and hydrology of the site. However, it does not include complex surveys or a specific delineation of resources. This information will be utilized to establish, in part, CME conservation value, and to establish a record of baseline site conditions that should be maintained once the conservation easement has been approved. The baseline inventory should be performed only within the boundaries of the proposed CME. If resources are identified outside of the proposed CME boundary that could benefit from preservation within the easement, then it may be necessary to revise the easement boundary. The inventory may involve both remote data gathering and onsite assessment and documentation. If available, information can be gathered remotely using publicly available sources. The scope of the remote data acquisition with potential sources should include:

- Geology: U.S. Geological Survey (USGS) and State of Montana mapping;
- Soils: Natural Resources Conservation Service (NRCS) soils survey;
- Hydrology: including presence of surface and ground water (USGS National Hydrography Dataset), wetlands (NRCS/U.S. Fish and Wildlife Service (USFWS) National Wetlands and Riparian Inventory) and floodplain (Federal Emergency Management Agency (FEMA) NFIP mapping).

The biological inventory can include, in addition to field survey, the following sources:

- Analysis of vegetation and wildlife species likely to occur in the area, based on the climate and habitat types;
- Montana State Library databases;
- US Department of Agriculture Plant Database;
- NRCS National Wetlands Inventory (NWI);
- Local county comprehensive planning documents;
- Photographs or video documentation of a species on the property;
- Documentation of flora or fauna species by experts, as provided through collaborative exchanges or landowner cooperation; and
- Historical records of plants or animals on the property, including previously-documented resources in field surveys identifying conservation values.

This site inventory can be included in the Baseline Documentation Report. This inventory should include a list of possible federally listed threatened and endangered species (TES) or state listed species of concern (defined as animals, plants, or plant communities that are rare, threatened, and/or have declining trends and thus are at risk or potentially at risk of extirpation in Montana). The USFWS maintains a list of TES by county, and the Montana Natural Heritage Program maintains a list of flora and fauna for the state using a standardized ranking system[8]. In addition, the inventory should also include a compendium of species that could occur on site based on identified vegetation communities.

[8]List accessible at: http://mtnhp.org/SpeciesOfConcern/?AorP=a

In addition to geology, hydrology and biological inventories, the site inventory should also identify site alterations such as existing buildings or structures, roads, powerlines, livestock facilities or irrigation facilities, as wells as any trash or debris such as abandoned vehicles or farm equipment, trash heaps/garbage or junk piles, concrete rubble, construction debris, etc. Site alterations and on-site debris should be located on site mapping or aerial photograph. Dimensions of all buildings and structures should be noted as well as GPS locations of all site features.

Photographs should be taken of all features noted during the site inventory. To satisfy the requirements of the Baseline Documentation Report (see Section 4.2.9) photo documentation should be geo-referenced. Utilizing a GPS enabled camera can satisfy this requirement. All features identified in the site inventory should be located using an appropriate GPS receiver.

Baseline Documentation Report

A Baseline Documentation Report (BDR) is required for all conservation easements held by land trusts. The landowner/CME grantor must approve and sign the BDR before a CME can be finalized. If a full baseline documentation report cannot be completed by closing, an interim report and a schedule for completing the full report will be signed by the landowner and the land trust at closing.

The BDR forms the basis for annual CME monitoring. The Site Inventory Report, developed during due diligence is, essentially, a preliminary version of the BDR. The BDR is finalized at the time that the final conservation easement terms are completed and approved, prior to closing.

Jurisdictional Wetland and Ordinary High Water Mark Survey

Even though a determination of the presence of wetlands is a part of the site inventory, a determination of jurisdictional wetlands and Ordinary High Water Marks (OHWMs) within the proposed CME should be made. Any enhancement activity proposed within the CME cannot have an adverse impact on jurisdictional Waters of the United States. If an adverse impact is predicted, then mitigation may be required through the Clean Water Act Section 404 process.

Site Appraisal

An appraisal of the CME value should be performed by a licensed real estate appraiser, and preferably one with conservation easement expertise. The appraiser needs to present an unbiased approach to the appraisal so that the property owner does not develop a perception of bias in the appraisal. The appraisal should cover the entire extent of the property and the appraisal covers the value of the land before and after the CME is established. The fair market value of the land is the difference between the two values.

In addition to visiting the site, the appraiser will generate an appraisal report, which includes an opinion of fair market value. The appraisal report will include parcel data, scope of work, general assumptions and limitations, opinion of value, project description, and intended use of the appraisal. The report produced by the appraiser must be approved by both the CME acquirer and land trust CME holder, in addition to meeting state regulations. The landowner will also have the opportunity to review this appraisal and comment if desired. If any entity objects to the appraisal, a second appraiser can be brought in to review and comment on the appraisal.

Purchase vs. Donation

The property owner has the option to either sell or donate the values of the land associated with the proposed CME. Some owners are interested in donating their land to qualify for a tax benefit. The landowner may qualify for a federal charitable income tax deduction if the CME transaction meets the requirements of the Internal Revenue Code section 170(h).

Land donated for establishment of a CME is treated as a charitable contribution. Therefore, the donating property owner can deduct the value of the easement against 50 percent of their adjusted gross income (AGI) for 16 years, including the year of project completion. Agricultural landowners may deduct the easement value against 100 percent of their AGI for 16 years.

Other potential donated CME tax benefits include:

- A reduction in property value for estate planning purposes;
- Deduction against 100 percent of a C corporation's annual income for 16 years including the year before the donation was made.

CME Stewardship, Management and Monitoring

The holder of a conservation easement must monitor the encumbered property to confirm compliance with easement restrictions and, when necessary, act to uphold the terms and conditions of the CME. These stewardship responsibilities are in perpetuity. Proper stewardship of a CME includes annual site monitoring visits, maintaining a positive, collaborative relationship and responding to landowners' questions and concerns about the easement, ensuring easement violations are appropriately resolved, responding to landowners' requests to exercise reserved rights, and amending the easement when necessary.

Costs of stewardship should be carefully monitored and documented so that adequate funding can be secured. At the beginning of the CME process, the cost of stewardship should be estimated; often a generic cost figure is used, ideally based on the acreage and complexity of the CME, and this amount placed in escrow. This amount can be updated as stewardship ages and matures and actual monitoring and management costs become better known. Stewardship costs can change if the landowner exercises reserved rights that complicate monitoring and management efforts. These cost increases should be negotiated with the landowner. A clause should be inserted in the CME document that specifies cost responsibility.

Monitoring of CMEs should include annual surveys of actual channel bank movement so that the migration rate is documented and becomes well known. Although conservation easements are considered perpetual, a CME is based on the migration rate. A CMZ lifespan is usually taken to be 100-years. If the monitored migration rate indicates that the lifespan of the CMZ is significantly less than 100-years due to changes in climate or watershed characteristics, then a CME amendment may be necessary, pending the voluntary participation of the landowner. Even if the channel, or one of its banks leaves and the landowner does not consent to a CME amendment, the original easement remains in place and stewardship responsibility remains. The holder of the CME generally does not perform land management activities; this is generally the responsibility of the landowner.

If the CME is funded by Section 404 or Natural Resource Damage sources, there may be additional monitoring requirements to document project success (e.g., permanent photo points, rapid assessments of channel stability, wetland delineations, etc.).

Appendix D

Case Studies of Channel Migration Easements

Yellowstone River, Montana

Appendix D: Case Studies

Lower Yellowstone River Channel Migration Easement

The first Channel Migration Easement closed in April 2016. MARS worked with the Montana Land Reliance to complete this 200-acre easement in the Lower Yellowstone River on a property that has experienced dramatic erosion over the last 50 years. The original parcel boundary was nearly 70 acres larger than the footprint today.

The easement prohibits bank stabilization of any kind, including soft stabilization techniques and planting vegetation for the express purpose of preventing erosion. However, it does not prohibit agricultural activities such as flood irrigation or alfalfa harvesting.

The easement was funded by bundling a number of grant sources, including funds from the Montana Fish, Wildlife and Parks, the Upper Pallid Sturgeon Working Group, the Western Area Power Administration, Northern Great Plains Joint Venture, and MARS' Supplemental Environmental Project partners including Montana DEQ and the Exxon Mobil Pipeline Company. Because some of this funding was from a governmental source, FWP completed an Environmental Impact Statement and was required to put the project on Public Notice. Comments received during this period of time were substantive; as a result there was a public hearing where stakeholders expressed concerns that this easement would put downstream landowners at risk.

MARS staff and board carefully considered these comments and testified at a public hearing. MARS testified that the lack of bank armoring did not pose an immediate threat to adjacent neighboring landowners or to any critical infrastructure. MARS also testified that bank armoring can be cost-prohibitive for small landowners with riverfront property, and it often requires maintenance or replacement that exceed the cost of eroded land or fields that are not able to be farmed any longer. This easement closed in 2016, and Montana Land Reliance will conduct annual monitoring to ensure compliance.

Figure D-1. Lateral bank migration from the 1950's to 2001 (note additional migration from 2001-2013).

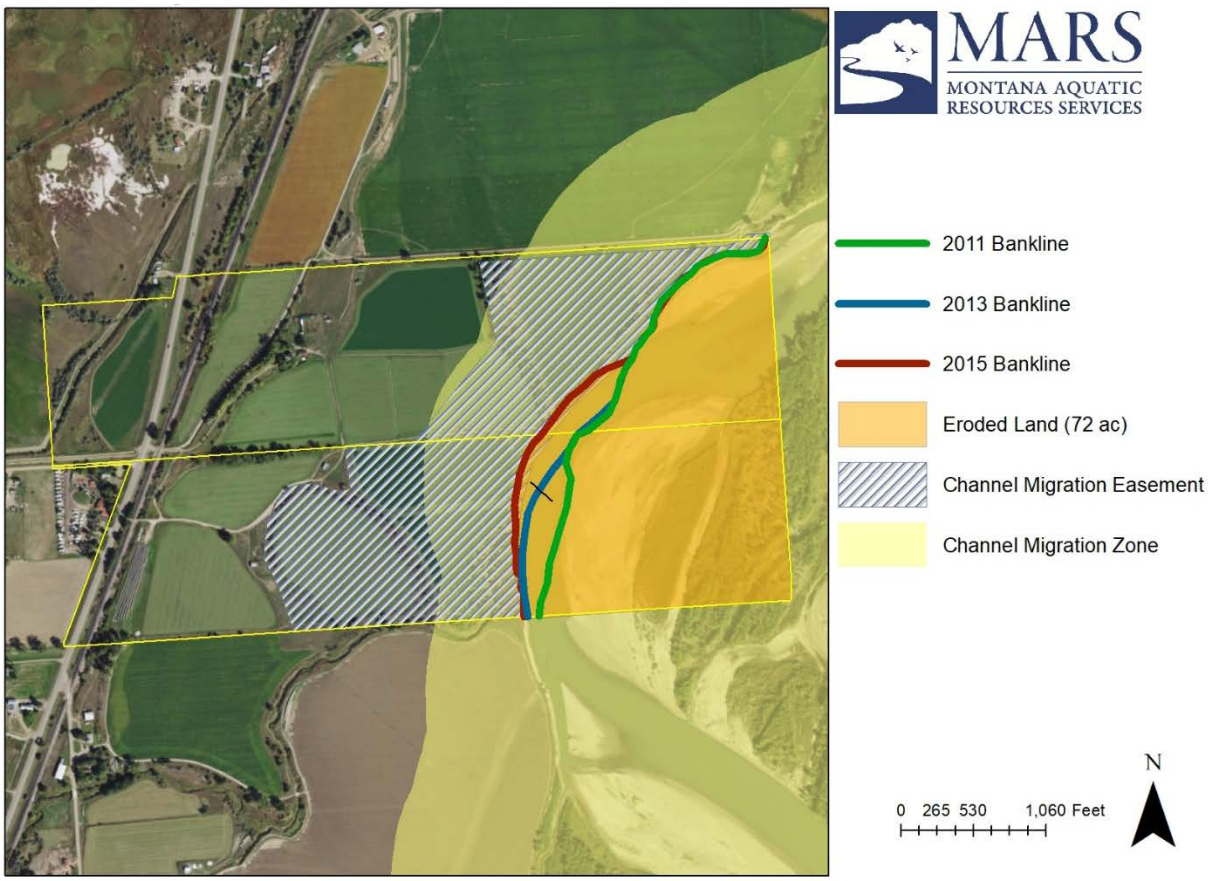

Figure D-2. This CME is located on an actively migrating bankline of the Yellowstone River. Over 70 acres of land loss has occurred within the CMZ since the land was surveyed by the General Land Office around the time of statehood.

Middle Yellowstone Channel Migration Easement

The second Channel Migration Easement closed in June 2017. MARS worked with The Nature Conservancy to complete this easement, which protects a total of 180 acres, 150 acres of which are CMZ. The property has approximately 5,300 feet of bankline and is located in an area where accretion and deposition have occurred in recent years (Figure D-3). MARS funded the easement payment through compensatory mitigation credit sales, Northern Great Plains Joint Venture and Supplementary Environmental Project funds from Montana DEQ and Exxon Mobil. The project generated compensatory mitigation credits and which offset impacts that occurred to the Yellowstone River (the same watershed where the impacts occurred). TNC now holds the easement and will assume stewardship and oversight to ensure compliance in perpetuity.

This CME was unique because in the process of establishing the footprint of the easement the landowner engaged in a Quiet Title Action, which sought to clarify the ownership of land that accreted to the landowner's property. A Quiet Title Action (QTA) occurs when there may be completing claims to a property and the property owner files a court action to "quiet", or settle ownership of the title. Recent erosion and accretion changed the landform such that the Yellowstone River began to erode into the landowner's property along the northwestern edge of the parcel, and an island began to accrete land into the landowner's property boundary along the southwestern side. At the same time land was deposited along the southern border of the property along the riverbank. MARS and the landowner worked together to determine that the best course of action was to establish ownership of the expanded southern boundary of the property and not attempt to lay claim to the portion of the island that had grown and migrated onto the original property boundaries (as surveyed by the General Land Office).

The Quiet Title Action took approximately one year to make it through the proper channels with the State of Montana's Department of Natural Resources Conservation Service and the State Land Board, which eventually approved the landowner's QTA.

This process may be necessary for actively eroding and accreting banklines where properties have shifted in recent years. A conservation easement payment is based on the acres of land preserved, and therefore it is important to establish clear ownership and conduct a precise survey of the parcel boundaries.

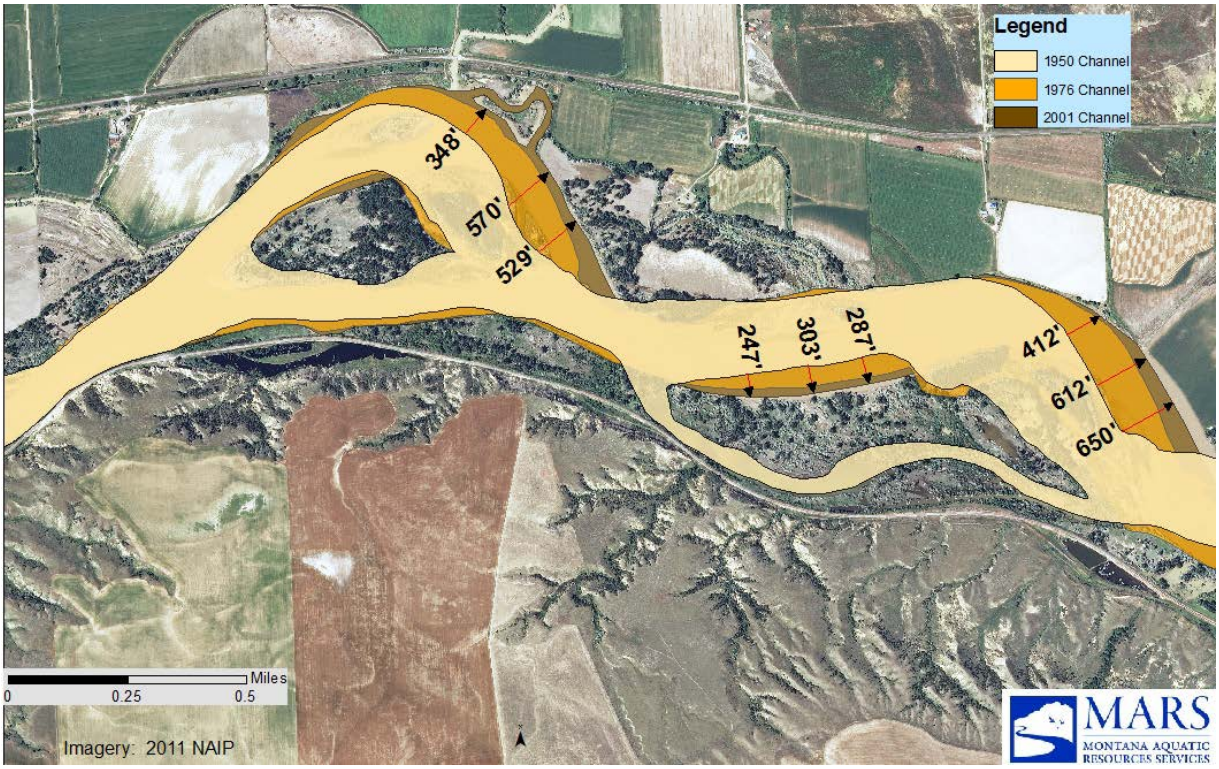

Figure D-3. Active Channel Migration Zone showing the distance the river bankline migrated from the 1950's to 2001.

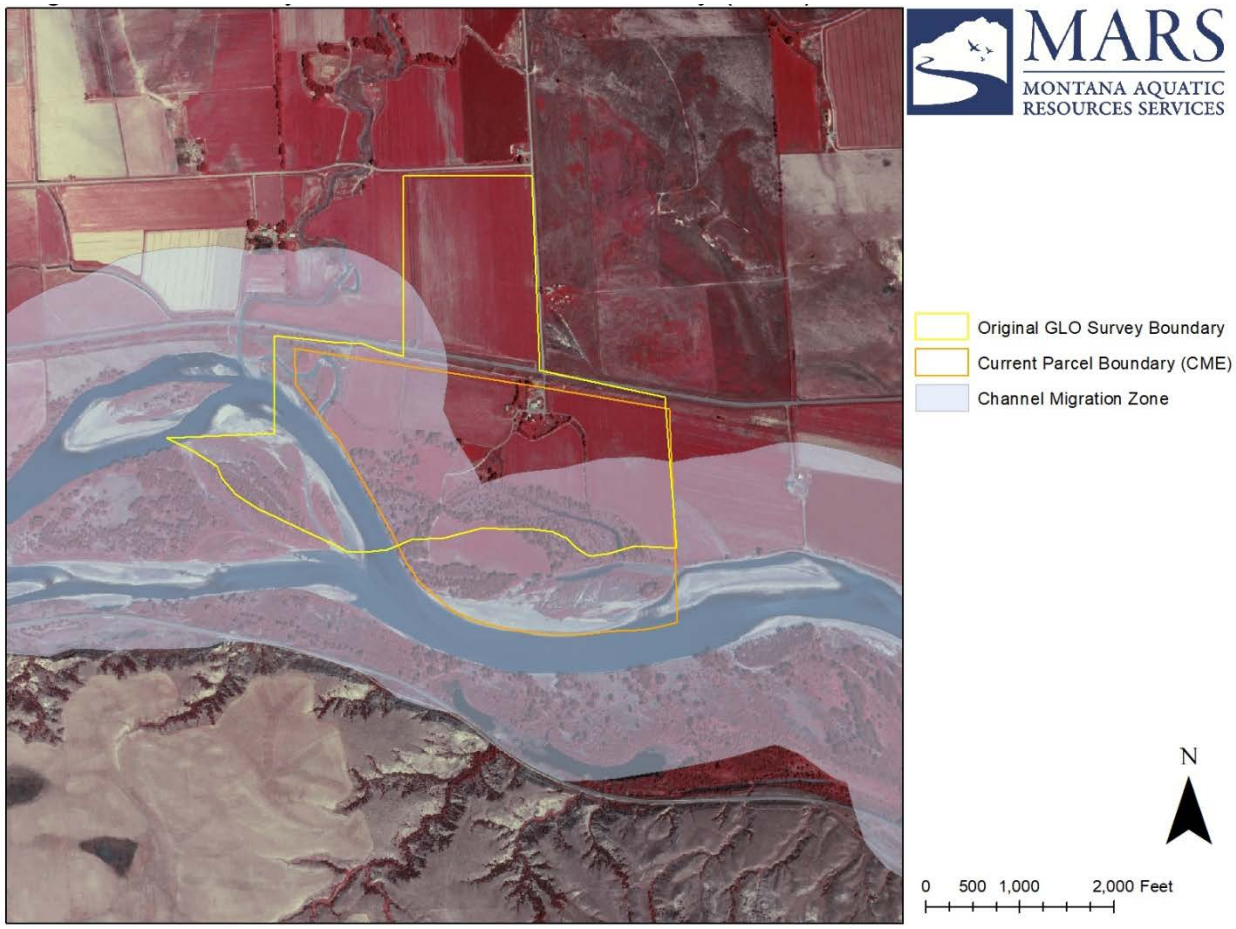

Figure D-4. The General Land Office surveyed boundary no longer corresponds with the existing river channel and bankline. Erosion occurred along the western edge of the property where the river channel now flows, and sediment has been deposited and land built along the southern edge of the parcel. The QTA established that the acreage that accreted along the southern edge of the parcel belongs to the landowner. The island and riverbed remains in state ownership.