

# ***Boulder County***

## ***Best Practice Recommendations and Resources***

### **for river front land owners impacted by the flood.**

(Revised January 3, 2014)

The Colorado Water Conservation Board's Stream Task Force is working on a variety of issues related to post-flood recovery or stream channels including but not limited to:

- reducing future flood hazards associated with unstable river channels and floodplain encroachments,
- assisting land owners in restoring the river corridor next to their properties,
- developing long term restoration plans to protect infrastructure,
- making our watersheds more resilient to future flooding events.

What follows are recommended best practices and contact information for stream restoration activities. Before implementing any significant restoration efforts, it is important to recognize that streams are dynamic interconnected systems. Activities upstream may affect neighbors downstream and vice versa. It is important that we collectively adopt best practices and implement them across our watersheds for lasting results. If left unaddressed, or incorrectly managed, you may not achieve the restoration efforts you desire or you may unknowingly impact the efforts of your neighbors.

For more information on our restoration efforts, or to lend your support, contact:

**Jeff Crane**  
**CWCB Stream Team Task Force**  
**Crane Associates**  
**jeff@craneassociates.com**

The Boulder County Emergency Operations Center is activated for the 2013 Boulder County Flood and will continue to respond to emergencies within Boulder County. Check the OEM website (<http://www.bouldercounty.org/flood/pages/default.aspx>), Boulder OEM Facebook Page, or Twitter Feed (@BoulderOEM) for updates. The Boulder County OEM Community Call Center number is 303-413-7730.

President Obama has issued a Major Disaster Declaration for Boulder County. People affected by the flood, even if they have flood insurance, should register with FEMA immediately by calling 800-621-3362. No matter how big or small the damage is, please report it with FEMA. This applies to all residents that are affected by the loss of municipal utilities.

**This Guide was originally compiled by the [Colorado Conservation Exchange](#), a non-profit group promoting best management practices to improve water quality and land stewardship in the Poudre and Big Thompson watersheds. It was updated and adapted for Boulder County by CWCB Stream Team members. Documents from the NRCS and CDPHE were utilized without direct citation for rapid deployment of this information. We fully acknowledge their hard work and leadership compiling this information and have provided additional resource links at the end of this document.**

# ***INITIAL DAMAGE ASSESSMENT***

## **Prepare a Sketch Map and Photos of Your Property**

To determine what has changed and plan what to do, it is best to first make a sketch map of your property. This will help guide you through the steps of restoration and help others understand your situation and provide the best assistance.

- 1) Outline your property boundaries and indicate neighbors and significant features adjacent to your property (using a background aerial image such as those found on Google Maps/Earth can be helpful).
- 2) Identify significant structures, roadways, wells and septic. Include head gates, ditches, bridges, etc.
- 3) Trace in the river as it crosses or passes by your property, also feeder streams, ditches, and any other waterways.
- 4) Sketch in the extent of flood damage and try to estimate the size of the area needing work, this will help you focus efforts and better work with neighbors.
- 5) Identify areas of surviving vegetation to be protected, such as cottonwood and willow trees. Look for patches of riparian shrubs such as willow that might be bent way over and covered in debris, but that may bounce back next spring. This will help you avoid further damaging important natural resources.
- 6) Estimate the depth and size of sediment accumulation, such as boulders, cobble, gravel/sand, and silt. Consider whether it might be contaminated by sewage, fuel, paint, fertilizers, and/or other materials requiring special care.
- 7) Use wooden stakes, pin flags or survey tape to identify the high water mark in as many places as possible. If you can identify flow paths, this will help hydrologists better understand your unique situation and how to best move forward.
- 8) Locate higher elevation staging areas away from the river's edge or next to roadways for storing materials and trash.
- 9) Locate other areas for stockpiling materials that can be useful in future restoration work, such a large trees and boulder.
- 10) If you have had a lot of scour and lost topsoil, think about designating a place to store and mix silt and sand with woodchips and other organic materials to make new soil or mulch.
- 11) Take lots of photos; include photos from specific places that can be re-photographed over time as your property heals.

## **SHORT-TERM ACTION**

### **Hazardous materials, trash and non-woody debris**

Prompt cleanup and appropriate management of flood debris enables residents to move forward with their lives while minimizing potential public health and environmental issues that may be exacerbated the longer the debris is left in place. For instance, prompt cleanup can prevent nuisance conditions, odors, disease, and water contamination from runoff.

- Boulder County has been working to coordinate debris removal. Directions for debris cleanup as well as a “flood debris reporting form” can be found here: <http://www.bouldercounty.org/flood/health/pages/debris.aspx>
- Questions about debris removal can be directed at [DebrisResponseTeam@bouldercounty.org](mailto:DebrisResponseTeam@bouldercounty.org) or call 720-564-2222
- The Colorado Department of Public Health and Environment developed an excellent guidance document on the “Management and Disposal of Flood Debris” following the 2013 floods. It can be found here: [http://www.walshenv.com/Files/Publications/131010045656\\_Guidance%20for%20post-flood%20recovery\\_CDPHE\\_debris.pdf](http://www.walshenv.com/Files/Publications/131010045656_Guidance%20for%20post-flood%20recovery_CDPHE_debris.pdf)
- The Colorado Department of Public Health and Environment is providing an online map of landfills that will accept flood and wildfire debris. The map can be found at: <http://goo.gl/maps/l3ksY>
- Boulder County’s Hazardous Material Management Facility may also be of assistance. For contact information and hours visit: <http://www.bouldercounty.org/env/hazwaste/pages/hazmatfacility.aspx>

### **Trees and natural woody materials**

The flood deposited many trees, brush, and plants along our waterways. Some of these will need to be moved to ensure culverts, bridges, and intakes are not clogged; if so, use the procedures outlined above. However, much natural material can be used for bank and channel stabilization as well as habitat restoration, and some can remain in place for passive habitat conservation (wood in streams often provides excellent habitat for fish and wildlife). What you see as dead brush may green up in the spring and become some animal’s home. Leaving some of your land more “wild” than it looked before could be the easiest strategy over the long run. Moreover, some of this material may be utilized--and paid for--by contractors and agencies working on restoration projects up and down the river. So, leave it in place if you can, or stockpile it for later use.

- Do not cut large logs into smaller pieces unless absolutely necessary. Leave large logs intact especially those with root wads attached, which could be used to construct future channel stabilization measures.
- Woody Debris 10” in diameter and



Photo: K. Jagt

Large woody debris should be left in place or stockpiled for future use.

larger: stock-pile it on site in an area that is not near the “normal” high flows that you typically see on your property in spring, to avoid it being carried downstream by floodwaters that may clog water intakes, bridges, or other structures.

- Woody Debris less than 10” diameter: stock pile for chipping (first grind, not fine mulch) to serve as cover and bank stabilization in areas that will be restored via seeding in future. Ground and chipped woody debris can also be mixed with silt to create soil for restoration of scour areas up and down the river (no more than 30 percent of this created soil should include wood chips).
- Boulder County is under quarantine for Ash Borer Beetle and as such, all procedures for moving ash trees must be followed and ash trees should not be chipped on your property. Residents participating in Boulder County operated flood-debris removal programs, including curbside debris collection do not have to take any special steps to maintain compliance with the quarantine. Debris collected by Boulder County is being treated and transported according to the requirements of the quarantine. If you have further questions about EAB please contact the CSU Extension in Longmont at 303-678-6238 orEAB@BoulderCounty.org

### Sediment and Silt Deposits

The river deposited a lot of sediment during the flood, some of which can remain in place, some will need to be moved.

- Excavation of in-channel sediment will require a permit from the Army Corps of Engineers and should be limited to the amount necessary to reestablish the pre-flood capacity of the channel and flood plain. River-friendly techniques to remove in-channel material are very specific and are best done in cooperation with a qualified professional.
- If you have a thin layer of silt (less than 2 inches deep) on your land and it is not toxic, there is a good chance grass and other vegetation will grow through it next summer. You can choose to leave it in place, add compost, if necessary, and monitor and manage it for weeds.
- If you have deeper layers of silt on your land and it is not toxic, consider removing it down to the level of prior vegetation and stockpiling the removed silt away from the normal spring high water mark.



Photo: K. Jagt

Thin, uncontaminated silt deposits such as these, should be left in place for vegetation to grow through this coming summer.

It may be used (and paid for by contractors or government agencies) at a later time.

- If you have a pond or wetland that has been covered with silt, consult the US Army Corps of Engineers (USACE) for permitting to remove that silt.
- As noted above, silt may be mixed with wood chips and organic matter (low in salts and nitrogen) to re-create soil on areas scoured by the river.
- Avoid direct contact with flood soils and sediment by wearing protective clothing boots, and gloves. Spread out the soil to allow the sun to dry it and kill pathogens. If the soil is heavily contaminated with sewage or other materials take it to a landfill. Wash carefully after contact.
- Individuals working with the sediment in a way that generates visible dust should consider wearing an N95 respirator as an additional precaution and make sure they wash their hands with soap and water.

- To this point, there have been few reported spills of hazardous materials that have been known to enter flood waters. Most flooded areas do not have soil that typically has elevated levels of chemicals or heavy metals
- In the near term it can be helpful to plant a sterile cover crop to stop silt/soil from blowing in the wind or washing back into the river until a re-vegetation plan can be created for a given property (see below).

### **Controlling Aquatic Nuisance Species**

In order to avoid the spread of invasive aquatic species, including but not limited to Eurasian water milfoil, zebra mussel, quagga mussel, and New Zealand mudsnail, these are the current best management practices:

- Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with water hotter than 140 degrees Fahrenheit for at least 10 minutes.
- Clean hand tools, boots, and any other equipment that will be used in the water with one of the above options as well. Do not move water from one water body to another. Be sure equipment is dry before use.
- If heavy equipment is used that was previously working in another stream, river, lake, pond, or wetland, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with a solution of commercial grade quaternary ammonium disinfectant compound containing at least 8.0% active ingredient diluted in solution to achieve at least 0.8% concentration (roughly 12 ounces of product per gallon of water). Specifically, a 1:15 solution of Quat 4 or Super HDQ Neutral institutional cleaner and water, can be used for effective treatment. Treated equipment should be kept moist for a least 10 minutes, managing rinsate as a solid waste in accordance with local, county, state, or federal regulations, OR

## ***LONG-TERM STREAM RESTORATION***

The best way to get your concerns addressed is to become a stakeholder in the rebuilding process through Boulder County or the citizen lead Boulder County Flood Coalition.

To become a participant in the Boulder County Planning process please sign up at:

<http://www.bouldercounty.org/flood/property/pages/creeks.aspx>

### **River bank and in-stream restoration**

The Stream Team is working to develop river-wide restoration plans to assist local land owners whenever possible. This effort will be much more successful if we work together.

Short term, emergency fixes in locations that are in imminent danger during spring runoff will be led by the NRCS and may rely on the “NRCS Streambank Soil Bioengineering Field Guide for Low Precipitation Areas” ([http://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/idpmcpussbfglpa.pdf](http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmcpussbfglpa.pdf)) which has bank and channel stabilization designs that have been proven effective for rivers in the west as well as provide a more natural functioning stream system for fish and other wildlife. In general best construction practices should adhere to the aforementioned considerations as well as the following:

- Mobilization of heavy equipment to the construction site should be implemented in such a way to minimize disturbance to the primary stream channel, side channels, and stream banks. This includes minimizing the number and footprint of access routes, staging areas, and work areas.

- Locate access routes, staging areas, and work areas within previously disturbed areas.
- Avoid fragmenting linear riparian corridors.
- To the maximum extent practicable, limit crushing, trampling or removing remaining vegetation, such as willows, trees, shrubs, and grasses within the work area.
- Rip compacted access routes and replant to weed free, native seed mixes and plants.
- Plan in-channel sediment excavation operations to avoid leaving an unstable headcut at the upstream end of the excavated reach, and may include constructing grade control structures where necessary. The variable bedform profile (e.g., riffle-pool sequencing) should not be altered unless there is a direct threat to life or property; a variable bedform represents an enhanced environmental condition that should not be degraded.



Photo: B. Vajda

Remember stream work requires permits! Instead of going it alone, we encourage landowners to become involved with the long term collaborative stream planning efforts in Boulder County in order to increase everyone's safety.

Remember, any work you may want to undertake in addition to the emergency NRCS projects in the stream channel, including filling or dredging, will likely require authorization from US Army Corps of Engineers (USACE). Although individual permits may be awarded we recommend waiting to act on restoration work until the long-term planning process is completed this spring as collaboration in restoration efforts will keep us all safer the next time we have a large flood. Become a participant in the process to get your voice and restoration needs met.

Longer term planning and project construction is beginning this winter and will also use designs from this manual as well as other proven techniques to lower the flood risk to all residents of Boulder County as well as to improve Boulder County's creek ecosystems. During this stage of river restoration, the Stream Team will seek

support for projects and practices that foster the following objectives:

- Protection of roads, bridges, homes, irrigation structures and other such fixed structures.
- Enhancement of resilient stream systems that include meanders, pools and riffles for fish habitat, secondary channels for spawning and numerous deep pools for over-wintering fish.
- Floodplain designs, such as oxbows and wetlands, which mitigate the impact of future flooding.
- Use of large tree trunks, boulders and other natural materials to create deflectors and other bank stabilizing structures in the river.

### Lost Soil

If your meadow or natural area has been scoured significantly (i.e., there is now river cobble where a green meadow or forest once existed), it may be an indicator that the land is part of the active stream channel. If assessment concludes that refilling these channel scours is appropriate it is most likely necessary to replace that topsoil before trying to re-establish vegetation. There will be significant costs associated with this effort. A coordinated river restoration plan is the best way to approach this problem. If top soil is brought in from another location, monitor it closely for new weed infestations during the growing season.

## Restoring Vegetation

Re-vegetating river banks is important for keeping water temperatures down, promoting fisheries habitat, increasing terrestrial habitat diversity, and binding silt and soil to reduce wind and water erosion.

- **Planting of recommended species.** We will be assisting re-vegetation projects that align with ecologically-friendly objectives, while avoiding planting of invasive or non-native species due to their detrimental effects on the environment and economy. Visit the Colorado State University Extension website (<http://www.coopext.colostate.edu/boulder/ag/agweeds.shtml>) for more information on native versus non-native plant species and management recommendations. The Natural Resources Conservation Service (970-295-5658) can help you understand the importance of species selection, timing, cover and weed control prior to and after re-vegetating.
- **Weed Control.** By applying early detection and rapid response to new weed infestations, landowners will minimize the amount of time and resources dedicated to ecological restoration.

## Fencing

For repairing and replacing fences, we will support designs that allow unrestricted, easy movement for wildlife, minimizing where possible cross fencing perpendicular to the river channel. For barb wire fences 3 strand is best for wildlife movement and 4 strands is workable as long as the bottom strand is at least 16 inches above ground and top strand is no more than 42 inches. Stays should be used between posts to keep strands from catching and wrapping wildlife legs caught in the fence. Wire fences can be enhanced by using smooth wire on the middle two strands, putting white vinyl markers on top strands, putting in lay down sections or drop rails along heavily traveled corridors or using high tensile 3 strand electric designs. Additional fencing suggestions are available in a publication from Colorado Parks and Wildlife titled ***Fencing with Wildlife in Mind*** available on line at <http://wildlife.state.co.us/SiteCollectionDocuments/DOW/LandWater/PrivateLandPrograms/FencingWithWildlifeInMind.pdf> or in paper copy from your local District Wildlife Manager

## ***FOR INFORMATION ON THE FLOOD***

NOAA and the NRCS have done excellent analysis on just how much rain fell and how severe the flooding was in several of the Front Range watersheds. If you are curious check out the following links:

<http://www.ncdc.noaa.gov/news/visualizing-september-2013-colorado-flood>

[http://www.nws.noaa.gov/oh/hdsc/aep\\_storm\\_analysis/8\\_Colorado\\_2013.pdf](http://www.nws.noaa.gov/oh/hdsc/aep_storm_analysis/8_Colorado_2013.pdf)

<http://www.climate.gov/news-features/event-tracker/historic-rainfall-and-floods-colorado>

## ***ADDITIONAL RESOURCES***

Boulder County Flood Response Information: <http://www.bouldercounty.org/flood/pages/default.aspx>

Federal Emergency Management Agency (FEMA): 1-800-621-3362 or 1-800-462-7585 for the speech/hearing-impaired. Apply for disaster aid online at [www.fema.gov](http://www.fema.gov) or go to [www.disasterassistance.gov](http://www.disasterassistance.gov)

Colorado Office of Emergency Management: Health-related flood questions: 1-877-462-2911 or (303) 389-1687

Map of shelters and quick facts: [www.COEmergency.com](http://www.COEmergency.com)

American Red Cross: Disaster and Emergency Assistance: Denver Office: (303) 722-7474, Fort Collins Office: (970) 226-5728 <http://www.redcross.org/find-help>

Colorado Department of Public Health and Environment Flood Resources (***Numerous documents here!***):

<http://www.colorado.gov/cs/Satellite/CDPHE-EPR/CBON/1251645971558>

USDA Farm Service Agency Disaster Assistance Programs:

<https://www.fsa.usda.gov/FSA/webapp?area=home&subject=diap&topic=landing>

USDA Natural Resources Conservation Service: <http://www.nrcs.usda.gov/wps/portal/nrcs/site/co/home/>

General non-emergency assistance: call 211

Instream and in-channel activities: including filling and dredging: such activities may require permitting by the US Army Core of Engineers (USACE)

Debris Cleanup: <http://www.bouldercounty.org/flood/health/pages/debris.aspx>

Management and Disposal of Flood Debris:

<http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content->

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Guidance for Stream Restoration: [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs144p2\\_062267.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_062267.pdf)

Colorado Water Conservation Board Flood Information: <http://cwcb.state.co.us/Pages/CWCBHome.aspx>