Beaver Dam Analogue (BDA) Project Field Work Plan TEMPLATE

Site: _____ Year of installation: _____

This template provides the outline to plan details for completion of the field work of a Beaver Dam Analogue (BDA) project including BDA Installation Materials, Equipment and Manpower List.

Other relevant documents include:

- BDA General Plan – outlines overview of project and general plan

Site Selection, Installation, Monitoring and Maintenance Activities

1. Site Selection Field Visit(s) [Note, if time allows, these may be combined with Project Design visits]

Goal: Walk and visit potential sites, determining overall fit for project and identify potential BDA structure locations sites, within project site. If all components cannot be completed or confirmed, a 2nd day may be needed.

Materials to have on hand:

- ☐ satellite / aerial imagery of sites and watershed (for context, flow considerations, etc)
- ☐ land ownership or administrative boundaries maps
- ☐ camera and GPS devices to photograph and document precise locations
- ☐ digital or paper tables/notebook to document sites and comments

- **Day 1** – Date:_____

Staff/Partners/Landowners to be involved: _____

If applicable, use data and comments from Day 1, to narrow down selection and do finalization on Day 2.

- **Day 2 [if needed]** – Date:_____

Staff/Partners/Landowners to be involved: _____

Outcome: Using field data and compiling it in the office, should result in finalized site(s) and locations of BDAs within a summary document. Include sites examined, pros, cons, and prioritised overall project site(s) and BDA structure locations (at least approximate locations). Include photos with captions, aerial/satellite images of sites (with GPS points) and descriptions of sites that outline desired outcomes and goals, as well as any logistical considerations (eg. access, available materials). Use GIS mapping if possible.

Once the site(s) has been selected, move onto Project Design.

2. Project Design Site Visit(s) [Note, if time allows, these may be combined with Site Selection Field Visits]

Goal: Measure, survey, and take detailed notes, photos and descriptions to determine what the project design will include, including details to determine amount and kind of materials and equipment needed to install the BDAs. Details should be captured at all locations of proposed structures and if possible, also at a site that is nearby but below (downstream) the most downstream structure and at a site that is nearby but upstream of all structures. If all components cannot be completed or confirmed in 1 day, a 2nd day may be needed.

Materials to have on hand:

- ☐ all mapping and imagery, along with finalized summary document created from Site Selection Field Visit
- ☐ management, flood and other history of the site, including any other relevant existing data or reports about the sites (hydrology, riparian health, weed or plant surveys, soil type, etc)
- ☐ camera and GPS devices to photograph and document precise locations
- ☐ digital or paper tables/notebook to document details and comments
- ☐ flagging tape, pin flags, survey stakes and markers to mark and label locations
- ☐ tape measure/ metre stick
- ☐ (if available and desired) survey equipment to determine level, heights
- ☐ (if available and desired) drone to capture "before" shots to create baseline aerial imagery
- ☐ (if a riparian health assessment or evaluation is to be done) riparian health assessment or inventory work order form

- **Day 1** – Date:_____

Staff/Partners/Landowners to be involved: _____

- **Day 2 [if needed]** – Date:_____

Staff/Partners/Landowners to be involved: _____

Outcome: Using field data and compiling it in the office, should result in finalized details and plan for BDA structures, including material types and volumes needed for installation. Plan to include required equipment and other resources, including sources, logistics, safety considerations and access as well as monitoring and maintenance plan. Should include georeferenced 'before' pictures (ground and/or low-level aerial) and notes, at each site, that can be replicated, once installation completed. If a full survey is completed, then will also include planiform and other mapping to depict survey data (elevations, relevant locations, etc). If a riparian health assessment or inventory is to be completed, then gather required background information as required. Ideally should include budget.

3. Riparian Health Assessment or Inventory (Baseline Monitoring) [recommended but not required]

Goal: Determine riparian health function before BDA installation to use to monitor changes, in health, plant communities, and physical aspects, after BDA influences site.

Steps to complete:

- ☐ If the site selected already has had this monitoring within 1-4 years, it will not be necessary to repeat.
- ☐ If monitoring is older than 4 years or has not been done before, complete a riparian health assessment or inventory
- ☐ Timeline: field work prior to BDA installation and within the growing season (June – September). Data entry, analysis and reporting: Fall/Winter.
- ☐ Work with Cows and Fish to complete this work, if applicable.

Outcome: Completed riparian health results, summarized, as well as detailed plant list, community and habitat types mapped and benchmark photographs of the sites, georeferenced, for comparison in the future.

4. Prepare for Installation

Goal: Identify and complete regulatory requirements specific to the project. Purchase or orders materials and equipment and people to install BDAs.

Steps to complete:

- ☐ Identify installation dates, allowing multiple days, and setting aside alternative dates

- ☐ As soon as is possible after installation plan finalized – complete regulatory applications required – will depend on site and plan, but may include approvals or permitting related to Water Act, Public Lands Act, Fisheries Act, Species at Risk Act
    - Ensure any additional materials and plans required as part of these regulatory or compliance aspects (eg. monitoring, erosion control, mitigation measures) are identified and included in the installation plan.
- ☐ As soon as is appropriate – identify and set up any elder or cultural protocol
- ☐ Identify sources for raw materials (e.g. willow, poplar, aspen stems, soil, rocks, mulch, other) (see Table 1 below for estimated list)
- ☐ Identify personnel and additional invitees (partners, volunteers) to assist with install and/or other preparation components
- ☐ Arrange for all necessary tools and who is to bring (see Table 2 below for estimated list)
- ☐ 1 month prior to installation (or sooner) – invite partners and others to assist with installation
- ☐ 1 week to 1 day prior to installation – cut and gather all live raw materials and take to site, leave in piles
- ☐ Up to 1 day prior to post installation, wet soil, if site is totally dry
- ☐ Re-mark/place flagging or other markers where structures are to go, before building, if these markers have not remained in place since planning visit.

Outcome: All regulatory approvals are in place and all materials and logistics are arranged to enable BDA installation.

5. Install BDA

Goal: Install structures within plan to accomplish goal of BDA(s)

Materials to have on hand and steps to complete:

- ☐ installation plan (images, maps, satellite imagery, etc)
- ☐ camera and GPS devices to photograph and document installation
- ☐ permitting and compliance paperwork
- ☐ Complete safety briefing and introductions, welcome, cultural protocol and orientation of plan to those present. If applicable, have safety and photo waiver forms for volunteers.
- ☐ digital or paper tables/notebook to document details and comments
- ☐ flagging tape, pin flags, survey stakes and markers to mark and label locations
- ☐ tape measure/ metre stick
- ☐ (if available and desired) survey equipment to determine level, heights after installation
- ☐ (if available and desired) drone to capture “after” shots to create comparison aerial imagery.
- ☐ If installing posts, consider installing the day before the rest of the installation, if possible.

Outcome: Completed BDA structures, including documentation summarizing the build (locations, numbers and images of structures).

6. Monitoring and Maintenance of BDA

Goal: Revisit structures to confirm integrity and monitor functionality, completing required maintenance.

Materials to have on hand and steps to complete:

- ☐ Take paper or digital copies of 'before' photos and plans when revisiting site
- ☐ Same year of installation: after installation, during any runoff events, or soon after runoff, check visit to see if BDAs are still in place, need repairs or adjustments or are functioning as intended.
- ☐ Additional installation materials (eg. willows, soil, etc) and field equipment to enable repairs (eg. waders, gloves, hand tools)
- ☐ Take georeferenced photos (ground and aerial if applicable) to document visit, including retaking 'before' photos as well as any new images needed.
- ☐ Depending on maintenance and monitoring plan: Year(s) after installation: in spring, after snowmelt and spring runoff, visit to see if BDAs are still in place, need repairs or adjustments or are functioning as intended.

Outcome: Functioning BDA structures, including documentation summarizing the repairs and current status (locations, numbers and images of structures).

BDA Installation Materials, Equipment and Manpower Lists

[Example—will vary depending on project]

Table 1. Raw Materials/Supplies List for BDA Installation

Raw Materials/Supplies:	**Quantity**	**Who to bring & How many of each, if split source**	**Notes:** deposit all materials as close to end use location as possible to avoid manually moving and re-moving items.
natural logs (to use as posts) (aspen or spruce) 3-4" diameter 5-6 ft long			Generally need sharpened to be useful as posts—using chainsaw or similar approach. Use live materials.
untreated commercial wooden posts			Use if natural logs are unavailable or inadequate
aspen sapling poles or branches (1-3" diameter). 3 m+ length, delimbed** except top			Ideal for mattress. May require numerous truckloads. **Keep the cut off limbs for adding to mattresses and weaving.
willow branches, as long as available, ideally 2 m+ length, delimbed**			Ideal for weaving. May require numerous truckloads. **Keep the cut off limbs for adding to mattresses and weaving.
wood mulch			For packing the voids; could be created on site, from excess woody material, if wood chipper is available and adequate material. May require many wheelbarrows full or truckloads.
clean soil - fine and coarser with more rock from in system or nearby			For packing the voids. May require many wheelbarrows full or truckloads; may be available on site, in existing banks, channel or floodplain areas, if suitable to use. May be part of sod clumps.
cobble or other small rock - available in system, nearby or brought in			For packing the voids. May require many wheel barrows or truckloads; may be available on site, in existing banks, channel or floodplain areas, if suitable to use.

Raw Materials/Supplies:	**Quantity**	**Who to bring & How many of each, if split source**	**Notes:** deposit all materials as close to end use location as possible to avoid manually moving and re-moving items.
grass / sedge /sod clumps			For building non-woody part of BDAs and for packing the voids. May require many wheelbarrows full or truckloads; may be available on site, pulled into adjacent BDA, from existing banks, channel or floodplain areas, if suitable to use.
water [see equipment)			see equipment
**keep all branches/limbs from trimmed willow and aspen to add to downstream "mattress" or other parts of BDAs.			

Table 2. Tools/Equipment List for BDA Installation

Tools/Equipment:	**Quantity (ESTIMATE UNTIL DESIGN COMPLETE)**	**Who to bring & How many each, if split source**	**Notes** – ensure safety training, skills and protective devices. Some equipment may be rentable, or for hire, with operators.
loppers			as many as possible – ideally 1 per person
hand pruners			as many as possible - ideally 1 per person
hand saws			as many as possible
power saw (perhaps battery powered)			bring charged back up batteries or plan other power source (eg. generator)
chain saw			only use if trained and appropriate safety personal protective equipment used
Wheelbarrow(s) and hand-pull wagons			to transport materials and small equipment
3 – 5 gallon buckets			Ensure sturdy handles. Will be used for a variety of items (soil, rock, water).
spades, short- and long-handled			as many as possible – likely at least 1 for every 2 people minimum
rakes			as many as possible – likely at least 1 for every 2 people minimum
pick axe/Pulaski			For reducing soil compaction or chopping sod chunks. Plan for several, up to 1 per person
tamping bars - pointed			as many as possible
tamping bars - flat			as many as possible
sledge hammer(s)			as many as possible

Tools/Equipment:	**Quantity (ESTIMATE UNTIL DESIGN COMPLETE)**	**Who to bring & How many each, if split source**	**Notes** – ensure safety training, skills and protective devices. Some equipment may be rentable, or for hire, with operators.
manual post pounder (sleeve type)			Plan for several. Use if no powered pounder available and as back up to powered post pounder.
post pounder: Gas powered hydraulic hand post pounder or other			Must be able to reach into channel where posts are being installed. Depending on soil and rock, having a powered device is much better.
jerry can with gas			To use if gas-power tools needed; ensure correct mix if mixed gas/oil.
string for line			Have a roll that can be cut into smaller pieces
survey stakes			To help show were to build
tape measures of various lengths 30-100 m			Enough to span channel distance being worked on, and shorter ones perpendicular to channel at BDA structures.
tape measure hand 16-25 ft			Plan for a couple at least
gloves, eye protection, safety vests			As many as we have people on site plus some extras
hearing protection			To be used if powered tools are used or extensive hammering, and should be available for each person working in that vicinity.

Tools/Equipment:	**Quantity (ESTIMATE UNTIL DESIGN COMPLETE)**	**Who to bring & How many each, if split source**	**Notes** – ensure safety training, skills and protective devices. Some equipment may be rentable, or for hire, with operators.
waders/rubber boots			Needed if stream holds water, raining and/or heavy dew overnight; part of what people should bring for themselves. Ensure they arrive clean and sanitized to prevent invasive species or disease spread.
twine/jute			a large roll, used for tying bundles of willow
pocket knife / utility knife / multi-tool with knife			to cut twine/jute or string
water storage & equipment to move water to structures (eg. tank, water truck with hoses, etc)			If sites are fully dry, soil needs to be wet to more easily install posts (usually wet the area several hours to a day in advance). Also needed if dry, to make mud to pack otherwise loose, dry soil.
general safety equipment: first aid kits, fire extinguishers/ fire water packs, remote communication devices, etc			will vary based on project needs
communications and documentation equipment and operator (data sheets, clipboard, camera, GPS, field data collector (eg. Trimble), microphone, drone)			will vary based on project needs
food and drink			will vary based on project needs; even if participants are to bring their own, consider having extra on hand

Tools/Equipment:	**Quantity (ESTIMATE UNTIL DESIGN COMPLETE)**	**Who to bring & How many each, if split source**	**Notes** – ensure safety training, skills and protective devices. Some equipment may be rentable, or for hire, with operators.
field sanitation (toilets, hand sanitizer, wash stations)			will vary based on project needs
soil sampling, water quality monitoring and water table measurements: piezometer, probe, auger, pipes, gauges, ziplock bags, sharpies			Optional, depending on project monitoring or research plans.