

All variables included in the wood jam dynamics database that describe wood jam characteristics and dynamics. Measurements regarding channels relate solely to the channel the wood jam resides in, even if there are multiple channels across the valley bottom. We categorize measurements by whether they describe hydrologic regime (blue), channel geometry (brown), reach-scale valley bottom characteristics (red), the location and geometry of the jam (purple), the physical characteristics of a jam (green), and characteristics specific to anthropogenic jams (grey).

Definitions:

Large Wood: Any wood piece approximately greater than 1 m in length and 0.10 m in diameter (all smaller wood is considered fine wood).

Key Piece: Any wood piece that retains (i.e., preventing downstream motion), ballasts (i.e., preventing upward motion), or supports (i.e., preventing falling motion) multiple other large wood pieces in the jam.

Data Collection Advice:

Identifying Key Pieces: A good way to identify key pieces is to look for pieces that, if removed, would destabilize multiple large wood pieces in the jam.

If Jam Spans Multiple Channels: If jam is at a diffluence (channel split), measure the jam using the characteristics for the channel upstream of the split. Otherwise, treat each part of the jam in each channel as a separate jam.

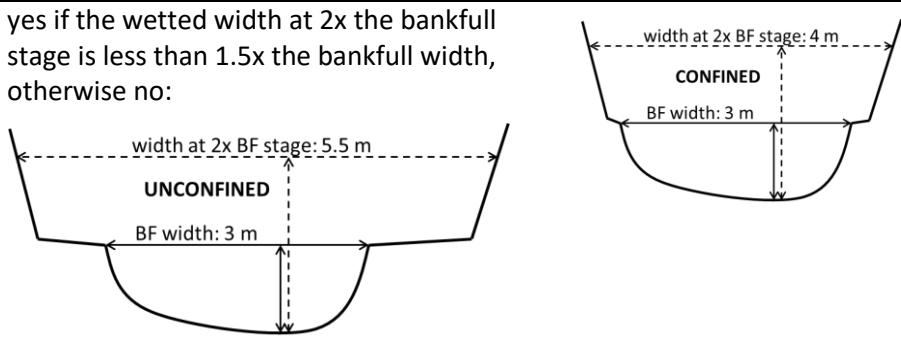
Delineating the Boundaries of Extremely Low Porosity Jams: Generally, all large wood pieces contacting either key pieces or a central bulk of the jam, if present, should be considered part of the jam. If delineating the boundaries of a jam is unclear, describe the boundaries, and whether the jam shares pieces with other jams, in the descriptive location.

Two Previously Surveyed Jams Conjoin: Resurvey to record wood jam dynamics information (variables recharacterization needed through expanded) for each previously separate jam, then survey a new jam with a jam number that is the combination of the previous two numbers. For instance, if jams "4" and "5" on a given river combined, assign then the new number "4/5", then reset the survey number to 1, treating them as a newly formed jam.

A Jam is Modified by Something Other than High Flow: Resurvey the jam as usual, but mark "yes" for the non-flow alteration variable and describe the thing that changed the jam (e.g., human alteration, fire, etc.) in the resurvey notes. Only mark the non-flow alteration variable as "yes" only if the jam lost/accumulated wood, mobilized, or contracted/expanded due to the alteration. A jam may need recharacterization even if this variable is marked as "no" (e.g., if fine wood was burnt in a fire, which would not count as a loss of wood, but might change the obstruction index).

Measurement	Possible Values	Description
river		Full name of river
state		Full name of state
jam #		One number per jam in a stream. Do not repeat numbers used for mobilized jams.
survey number		1 if the initial survey of a jam, otherwise 2 if first resurvey, 3 if second resurvey, etc. For jams that have been combined (e.g., jam 5/6), treat as

		initial survey the first time the jams are combined, regardless of how many times the two formerly separate jams have been surveyed.
descriptive location		Location relative to noticeable landmarks and position in channel (e.g., left or right bank)
latitude		Decimal degrees, e.g., "+/- ####.#####"
longitude		Decimal degrees, e.g., "+/- ####.#####"
perennial?	y, n	yes if the stream experience surface flow year-round on an average water year
flashy?	y, n	yes if high flow events characterized by rapid increases in flow such that the bankfull channel can go from a low or moderate flow stage to a high flow stage in less than 24 hours
sustained peaks?	y, n	yes if high flow events are characterized by durations over approximately one week
ice jams?	y, n	yes if in a typical water year, the river transports enough large ice pieces to cause ice jams in the reach surrounding the wood jam
melt-driven?	y, n	yes if in a typical water year, high flows are driven by the melt of snow or glacial ice
bankfull depth	meters	bankfull depth that best characterizes the reach around the jam (see solid vertical line in confinement diagram below)
bankfull width	meters	bankfull width that best characterizes the reach around the jam
local slope	% or degrees	from above to below sediment wedge behind wood jam, or the slope that best characterizes the reach around the jam
visual clast size	S, G, C, B, BR	visual estimate of dominant clast size on bed in reach surrounding jam: sand [s] (<2mm), gravel [g] (2-64mm), cobbles [c] (64-256mm), boulders [b] (>256mm), bedrock [br]
bedform	SB, PR, PB, SP, C	from Montgomery and Buffington (1997): sand bed [sb], pool-riffle [pr], plane-bed [pb], step-pool [sp], cascade [c]
planform	S, M, A, B	straight if one channel and sinuosity < 1.5 [s], meandering if one channel and sinuosity >1.5 and evidence of migration (point bars, cut banks) [m], anastomosing if multiple channels and vegetated islands [a], braided if multiple channels and non/sparsely vegetated islands [b].
isolated?	y, n	yes if no wood surrounding jam within sight or 5 channel widths upstream/downstream, whichever is shorter
in side channel?	y, n	yes if bulk of wood resides in a channel with approximately less than half the cross-sectional area at bankfull flow of the main channel)?
floodplain present?	y, n	yes if floodplain surface exists within valley near jam, no if no floodplain exists
confined?	y, n	yes if the wetted width at 2x the bankfull stage is less than 1.5x the bankfull width, otherwise no:



touches bed?	y, n	yes if any key pieces of jam touch the channel bed
touches banks?	y, n	yes if any key pieces touch channel bank
touches floodplain surface?	y, n	yes if any key pieces of the jam contact floodplain surface (including woody vegetated bar tops in anastamosing channels)
touches valley wall?	y, n	yes if any key pieces of the jam contact valley wall surface (including terraces and objects fixed to valley wall like trees, stumps, infrastructure, etc.)
touches outer bend?	y, n	yes if any key pieces of the jam contact the outer bend of the channel. If no outer bend exists (e.g., straight channel) this must be no.
touches inner bend?	y, n	yes if any key pieces of the jam contact the inner bend of the channel. If no inner bend exists (e.g., straight channel) this must be no.
occupies thalweg?	y, n	yes if any key pieces are in or above the thalweg.
channel spanning?	y, n	yes if any key pieces or a combination of multiple key pieces together touch both channel banks
parallel orientation?	y, n	yes if the bulk of the jam longer (parallel to flow) than it is wide (perpendicular to flow)
key pieces >15 degrees?	y, n	yes if trunk of any key piece is at an angle over ~15 degrees relative to horizontal

The diagram illustrates a river bend with a jam. It shows various contact points for a jam, indicated by arrows pointing to specific locations on the river bank, floodplain, and valley wall. The labels for these points are:

- touch valley wall?
- touch outer bank?
- touch inner bank?
- touch floodplain?
- touch bed?
- key piece above bankfull?
- parallel orientation?
- channel spanning?
- occupy thalweg?

obstruction index (1-3)	1-3	<p>3: Can't see light coming through most of the jam. Creates backwater and flow through jam is heavily obstructed. Estimated porosity <25%. 2: Can see light coming through the jam, but you may not be able to see through the jam in all spots. Flow likely interacts with wood but still flows through. Noticeable change in water surface elevation from upstream to downstream side of jam. Estimated porosity 25-75%. 1: Can see through most parts of the jam. Water flows freely (or would flow freely at high flow) through jam. Large voids. Estimated porosity >75%.</p>
morphologically impactful?	y, n	yes if jam significantly impacted morphology around it (e.g., scour pools, bank erosion, deposited bars, sediment wedges)
buried?	y, n	yes if any key pieces at least partially buried by sediment
key pieces above bankfull?	y, n	yes if any trunks or rootwads of key pieces of the jam extend above bankfull depth. If jam touches floodplain surface, this must be yes.
fines?	y, n	yes if there are fine pieces of wood or sediment visible on/in the jam
pinned?	y, n	yes if any key pieces of jam are pinned on a relatively immobile object (e.g., large boulders, live and non-sapling trees, mid-channel bars that have been stabilized by vegetation, bridge piers, etc.)
pinning object above bankfull?	y, n	yes if the object the jam is pinned on extends above bankfull depth. If jam is not pinned, this must be no.
decay class	1-5	<p>Scale paraphrased from Harmon et al. (2011). Most jams in rivers will be category 1-3, and it is nearly impossible for a jam to be 5. Applies to key pieces only.</p> <p>1: Sound, freshly fallen, intact logs with no rot, fine twigs attached with tight bark. 2: Sound log sapwood partly soft but can't be pulled apart by hand, many fine twigs are gone and remaining fine twigs have peeling bark. 3: Heartwood is still sound with piece supporting its own weight, sapwood can be pulled apart by hand or is missing, wood color is reddish-brown or original color, only branch stubs are remaining which cannot be pulled out of log. 4: Heartwood is rotten with piece unable to support own weight, a metal pin can be pushed into heartwood, branch stubs can be pulled out. 5: There is no remaining structural integrity to the piece with a lack of circular shape as rot spreads out across ground, rotten texture is soft and can become powder when dry, wood color is red-brown to dark brown</p>

in situ?	y, n	yes if any of the key pieces of the jam are sourced from the banks directly adjacent to the jam
rootwads?	y, n	yes if any rootwads are attached to any pieces in the jam
live wood?	y, n	yes if live woody vegetation is growing on or touching the jam, including any woody vegetation that is utilizing the jam as substrate to grow, growing through the jam, or growing proximal to the jam and touching it (e.g., if the jam is pinned on or bordered by live wood).
multi-trunk?	y, n	yes if any key pieces of jam have multiple trunks (common in species such as cottonwood, maple, etc.)
anthropogenic?	y, n	yes if the jam was entirely or partially placed, engineered, or designed by humans; no only if the jam was entirely naturally formed. <i>wood placed by humans may be cut on one or both ends, may have branches trimmed, and/or may have gouge marks from heavy machinery or cable/chokers</i>
proportion of anthropogenic pieces	none, some, most, all	note how many key pieces in the jam were placed by humans: none (0), some ($\leq 50\%$), most ($> 50\%$) or all (100% of key pieces)
internal anchoring		note what, if any, features anchor key pieces to other logs within the jam (e.g., rope, cable, rebar, threaded rod, etc.).
external anchoring		note what, if any, features (e.g., rope, cable, rebar, threaded rod, etc.) anchor key pieces in the jam to relatively immobile parts of the valley bottom (e.g., woody vegetation, large boulders, infrastructure, etc.)
ballast		note what features (if any) provide ballast to the jam (e.g., large boulders placed atop the jam, cabled rock collars, etc.)
pilings?	y, n	yes if near-vertical pilings have been buried in the valley bottom that act as jam key pieces
artificially buried?	y, n	yes if key pieces other than pilings have been deliberately buried in or driven into the valley bottom
survey picture time	24 hour format	Used to reference photographs taken of jam for use in detecting change during resurveys
date of survey	DD/MM/YYYY	Used to put resurvey data in context, if resurvey data is provided
survey notes		Use to provide added context to observations. Helpful notes might include any relevant characteristics not captured by the variables included in WooDDAM, instructions for accessing the jam if access is difficult, how pictures or GPS were taken, etc.
recharacterization needed	y, n	yes if any of the above variables have changed since the initial survey (including channel dimensions). This enables data to simply be copied to the next observation for this jam if no change occurred.
resurvey picture time	24 hour format	Used to reference photographs taken of jam for use in detecting change during resurveys
date of resurvey	DD/MM/YYYY	Used to put resurvey data in context, if resurvey data is provided
resurvey notes		Note details about how jam has changed.
qualitative magnitude of high flow	below, near, or above bankfull	optional, but extremely helpful: the qualitative magnitude of high flow can be estimated during a resurvey using geomorphic and vegetation markers of recent peak flows

quantitative magnitude of high flow	cms	optional: the quantitative magnitude of high flow can be estimated from nearby flow gage data during the period between surveys
mobilized?	y, n	yes if upon resurvey, wood jam is found to be either no longer a jam (lost enough pieces to be less than 3 pieces touching) or completely gone from its initial position
lost wood?	y, n	yes if large wood pieces observed in the initial survey are unable to be located in the resurvey
accumulated wood?	y, n	yes if new large wood pieces are observed in the resurvey that were not present in the jam in the initial survey
contracted?	y, n	yes if the volume of the jam decreased noticeably apart from any loss of wood
expanded?	y, n	yes if the volume of the jam increased noticeably apart from any accumulation of wood
non-flow alteration?	y, n	yes if mobilization, loss/accumulation of wood, contraction, or expansion occurred between surveys due to influences other than flow (e.g., human alteration, fire, etc.). Describe non-flow influence in resurvey notes.