Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD

STREAM HABITAT IMPROVEMENT AND MANAGEMENT

CODE 395

(ac)

INITIAL REVIEW – Comments and Responses

Drafted technical standard text (as sent for Initial Review) is in black and blue fonts. National minimum requirements are in black font; Wisconsin specific criteria is denoted with blue font.

Comments are in red, preceded by comment number (**C#**). To find a specific comment number, search for that number using "Ctrl + F" (Windows) or "Command + F" (Mac).

Responses to comments are in green italics.

Changes to standard text are in tracked changes.

General Comments

C41: Overall, my biggest critique is that the document is not as clear as it should be around this issue of stream stability versus dynamism. I think there should be much more candid language around the tension that is at play in a lot of these restoration projects. Clearly, the majority of projects installed recently have an explicit goal of eliminating all lateral stream migration. There are many reasons for this including 1) the protection of infrastructure, cropland, private land in general, and 2) the often inflated perception that bank erosion is a net contributor of sediment downstream when, in reality, bank erosion is very often balanced by deposition within a given reach leading to a close balance over long time scales (certainly, exceptions to this exist in areas with a lot of post-settlement alluvium like the Driftless Area where new floodplain elevations being lower than historical ones indicate a net loss of sediment over a given reach). But when conditions are available and landowners are willing (especially if a single landowner owns both sides of a stream), there needs to be explicit encouragement - via these standards and other mechanisms - to allow streams to move and adjust to extreme events and changes to upstream inputs and drivers. Otherwise, we are setting ourselves up for more project "failures" that need to be "fixed" with more hard structures.

RESPONSE: This standard was developed to establish technical criteria for stream habitat improvement. Practices installed under this standard are not anticipated or intended to restrict lateral channel migration, which is addressed in other standards (e.g., CPS 580 Streambank and Shoreline Protection). This standard is not intended to be a policy document with regard to the funding, promotion, or restriction of lateral channel migration.

DEFINITION

Improve, restore, or maintain the ecological functions of a stream and its adjacent floodplain and riparian area.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Improve or manage stream habitat by evaluating and addressing factors that impair stream function and structure.

CONDITIONS WHERE PRACTICE APPLIES

All streams and their associated backwaters, floodplains, wetlands, and riparian areas with impaired habitat.

C47: A definition for "Impaired habitat" may be necessary, perhaps including a distinction between a man-made impairment vs a natural impairment. Does this practice also include non-impaired areas, or are those areas demarcated as out-of-scope in some way? Add: "*For the purpose of this practice, impaired habitat is defined as any stream habitat that is weakened, or diminished in its functional capacity. Habitat impairment can be caused by natural occurrence such as heavy rainfall, washout and erosion, but may also be man-made, as in an unintended result of nearby urban development*."

RESPONSE: The planner is assumed to understand and recognize impaired habitat prior to using this standard. This standard does not propose to provide a definition or assessment of impaired habitat. It is a broad and complex topic depending on the plants and organisms considered.

This practice ~~applies to~~includes the placement of ~~large~~ woody material and rock structures in streams to create scour holes or redirect flow for in-stream habitat, for example: root wads, log vanes (deflectors), cross vanes (vortex weirs), rock/log weirs, and overhead cover.

C4: This is very specific terminology at a place in the standard that maybe you want to be more general. This might get picked apart. // **C46:** This section should not include specific practices that apply. The statement "This practice applies to the placement of large woody material…" should be moved to the criteria section. By keeping this statement in the conditions section it confuses whether the standard applies to "small" structures such as brush bundles which it obviously does include. The conditions are to cover a broad range.

RESPONSE: Text adjusted. Language is general to apply in this section and specifics are provided in Criteria.

C15: I understand there is limited ability to modify the federal (black text) guidance but it does seem somewhat contradictory in stating it applies to stream-associated wetlands and subsequent (federal) text indicates it does not.

RESPONSE: Federal wording cannot be changed by the State. This is a standard for stream habitat, wetland habitat located in CPS 587.

C16: The practices described are primarily used to improve habitat for gamefish – primarily trout. The vast majority of stream miles in WI are either too small or too warm to support trout. If the majority of projects are on trout waters maybe this is a moot point.

RESPONSE: The listed structures can be used for both cold water and warm water species.

This practice does not apply to—

- The management of fish and wildlife habitat on wetlands enhanced under this standard.

C29: This is confusing….If this practice doesn't apply how can wetlands be enhanced under this standard? Should this state that standalone wetland projects are not associated with this practice?

RESPONSE: Federal wording cannot be changed by the State. This is a standard for stream habitat, whereas wetland habitat is located in CPS 587.

- Streambed or bank stabilization; instead, use Conservation Practice Standard (CPS) Streambank and Shoreline Protection (Code 580), or CPS Channel Bed Stabilization (Code 584).

This practice may be used in conjunction with other practices to address multiple resource concerns at the site.

CRITERIA

General Criteria Applicable to All Purposes

Use this practice to assess, evaluate, and prescribe a comprehensive plan for stream habitat improvement, including the use of associated practices to address functionally connected floodplains and wetlands. Consult with ~~a DNR fish biologist along with~~ an interdisciplinary team (landowner, DNR fish biologist, technician, conservationist, etc.) to collectively ~~to~~ determine habitat and management objectives for fish species, invertebrates, and other aquatic and riparian organisms.

C5 // C30 // C45: Recommend you change to "Qualified" fish biologist [rather than DNR]. Other agencies and non-profits have them. // Seems like it should say fish biologist not DNR fish biologist. Is the DNR fish biologist really going to be able to handle all requests in a timely manner? The DNR fish biologist(s) almost always concur with the habitat placement. They look at the plans before the permit is issued, and rarely make recommendations. Again, can we refer to any fish biologist here? // The agency [NRCS] is finally (past few years) moving away from placing "policy" statement in a technical standard. The criteria and consideration sections provided what the person will do to implement the practice, not what NRCS will do when planning the practice. So the statement you provided would be inappropriate in criteria or considerations. Where it might fit is under the **Plans and Specifications** section, but even in that section, the statement is something that better fits in a biology manual or handbook (don't have), or a state bulletin. A more appropriate statement would be under the Plans and Spec's heading, add "Identify and describe the target stream habitat conditions". If a planner is struggling (which virtually all would) in describing the target conditions, they can ask for technical assistance from a DNR bio or another source.

RESPONSE: The language was softened to recommend, but not require, a DNR Fish Biologist on an interdisciplinary team. The SOC committee highly recommends consultation with a DNR Fish Biologist before the design is finalized and reviewed by the DNR permitting section. The DNR unifies regulatory, environmental quality, and resource management functions to provide for a fisheries management program that supports 161 different fish species. It is important that a practitioner seeking to implement projects that impact aquatic habitat is aware that the state fisheries biologist has a role and responsibility in the project. As a result, the DNR Fish Biologist was elevated from Consideration section to a recommended member of an interdisciplinary team in the Criteria section.

C11: Excellent addition. DNR fish biologists will be the best source for stream-specific biological data and management objectives. Ideally, consultation should occur prior to development of final project plan and landowner signing a contract – especially since DNR and/or other partners may be a source of financial contributions to the project or act as the contractor. Pre-project consultation with team also important for discussion of potential additional stream work (non-NRCS) within the same project area.

RESPONSE: Thank you, the team agrees with your comment.

C17: The primary (if not sole) mission of DNR Fisheries biologists is to improve fishing opportunities

and angling success for the public. My experience has been there is little consideration for non-game species, amphibious or terrestrial animals, or watershed and in-stream physical processes. I don't think the interdisciplinary team described has the necessary breadth of technical knowledge to truly assess hydrologic and hydraulic/hydrogeomorphic processes, that may be needed to design practice installations that affect or are affected by various meteorological, hydrological, and hydraulic processes. My experience has been when doing stream ecological assessments that many of the instream practices described have a < 10 yr. life span, increasing storm frequencies and intensities, presumably increase failure rates. Seems the state (both public and private sectors) lacks technical expertise in the areas of hydrology, hydraulics and geomorphology, resulting less-well designed projects with higher likelihood of failure. Not certain if there is a way these guidance can somehow help address this situation.

RESPONSE: Managing the anthropogenic aspect of fisheries management is just one aspect of a fisheries biologist. They also manage fisheries populations by using sound management techniques and collecting current biological data to inform those technique, including evaluation of habitat and how fish populations respond to habitat changes. Non-game native fish species also increase in abundance post-project completion.

During a major storm event in 2018, numerous flood control structures that were engineered by qualified hydrologists and engineers failed (including massive dam failures) with damage to some habitat/stream projects but not all. Some of these structures dated back to the 1960s. In this type of extreme hydrologic episode not all project failures can be prevented.

The team considered that extreme events may occur more frequently in the future. How to manage and design for more resilient designs and projects will also be considered in training.

C47: It seems like interdisciplinary team collaboration is a key element to defining overall project goals, so this team should, in essence, be a requirement.

RESPONSE: Agreed; Criteria are required.

C18: Not to get too preachy but the interface between two distinctly environments (ecotones) are some of the most important habitats on the planet, e.g. the stream – upland interface. I think greater awareness of this and focus on stream and river ecotones would be more effective in maintaining biological integrity/resiliency of streams than the in-stream practices described. Perhaps this is or should be or is addressed in the shoreland practices.

RESPONSE: We agree and this concept will be recommended for training.

Planned stream habitat improvements must—

- Be applied within the context of the overall watershed conditions and with clear objectives for stream habitat management goals.
- Be based on a site-specific assessment of local hydrology, channel morphology, geomorphic setting, fish and other aquatic species present, riparian area and floodplain conditions, and any habitat limitations including streamflow conditions, water quality, food supply, and restriction on upstream and downstream movement of aquatic species, as determined using the NRCS Stream Visual Assessment Protocol, Version 2 (SVAP2) or comparable State-approved aquatic habitat evaluation tool. Refer to the applicable habitat suitability indices in the WI NRCS Field Office Technical Guide, Section III.

C19: Does SVAP2 facilitate the necessary site-specific assessment or do other tools need to be used in conjunction with SVAP2?

RESPONSE: No. The aquatic habitat tool in FOTG Section III, Habitat Suitability Index, is the state-approved aquatic habitat tool for site-specific assessment.

C31: Are we no longer to use Companion Document 580-12 Fish Habitat Structures: A Selection Guide for Stream Classification?

RESPONSE: The planner may use a lot of different companion documents and

references to make stream habitat improvements, but they need to comply with the technical criteria in this standard.

- When applied, results in a conservation system that addresses specific habitat objectives and meets or exceeds the minimum planning criteria for stream and aquatic habitat established in Section III of the Field Office Technical Guide.
- Design in-stream structures to be compatible with the dynamic nature of streams and rivers, facilitate natural geomorphic recovery where possible, and minimize disruption of recreational and other traditional uses of the stream corridor.

  C20: I realize based on the "Reviewer's Guidance" that the black text is part of the federal language and likely not subject to change but feel compelled comment: In-stream structures described seem to be in direct conflict with "the dynamic nature of stream movement." Streams naturally have lateral movement yet we try to anchor them with wood and rock and are perplexed when these structures often get destroyed by storm events. Mother Nature bats last.

  RESPONSE: Federal wording cannot be changed by the State; however, these practices have a history of being stable and beneficial to streams.

  C42: I appreciate the sentiment here but not clear exactly what this ["facilitate natural geomorphic recovery"] means? I am very interested in the idea of allowing streams to be dynamic/deformable/adjustable as they encounter both extreme events and gradual changes in inputs and upstream drivers. Is that what this means?

  RESPONSE: Federal wording cannot be changed by the State; however, this is what federal language is trying to spell out.

- Use acceptable design methodologies and criteria for in-stream structures. Coordinate with State-level technical experts to determine design methodologies applicable to your State or area.

  C21: Do these State-level technical experts exist (e.g. hydrogeomorphologists) and are they available for such consultation?

  RESPONSE: Yes, there are State Habitat Specialists.

  C32: Do we need this in here, aren't we all in Wisconsin?

  RESPONSE: True; however, this Federal language cannot be removed.

- Enable adjoining floodplain and riparian areas to support a diverse vegetation community suitable for the site conditions and desired ecological benefits to the greatest extent possible.

  C33: Does this mean native seeding mixes? How does stream habitat enable areas to support diverse vegetation?

  RESPONSE: Stream habitat projects may include native seeding.

- Use native plant materials in project installations to the maximum extent possible.

  C22: Does native plant materials mean e.g. nearby trees for in-stream coarse woody debris, native plant species to be used in plantings, or both, other?

  RESPONSE: Both

  C34: Should this say onsite materials instead of native (implying use trees from the site for

root wads, cross logs, etc.)?

RESPONSE: Team believes National wording is acceptable.

- Manage livestock to sustain a healthy stream corridor and associated habitats.

C35: Livestock must be managed at all times of the year to prevent erosion, the accumulation of manure and the loss of adequate or self-sustaining vegetative cover.

RESPONSE: We agree!

C1: Can you mention limiting the number of planned structures based on the habitat suitability index and reference reach? That seems to be the way of controlling excessive applications of structures which can cause fish stunting.

RESPONSE: Fish stunting is viewed as a management issue, not a habitat issue. The habitat suitability indices are referenced elsewhere in this standard:

"Be based on a site-specific assessment of local hydrology, channel morphology, geomorphic setting, fish and other aquatic species present, riparian area and floodplain conditions, and any habitat limitations including streamflow conditions, water quality, food supply, and restriction on upstream and downstream movement of aquatic species, as determined using the NRCS Stream Visual Assessment Protocol, Version 2 (SVAP2) or comparable State-approved aquatic habitat evaluation tool. Refer to the applicable habitat suitability indices in the WI NRCS Field Office Technical Guide, Section III."

C2: Add that planned improvements must be approved by the Regional WDNR fish biologist. While not every application is perfect the WDNR has been doing habitat restoration for 50 plus years in Wisconsin and has training, experience and expertise in what works well. Engineering staff are typically not experts in biology, habitat etc. and are trying to learn in their spare time.

RESPONSE: This consultation is in 1st paragraph of General Criteria Applicable to All Purposes.

C49: Add bullet "*Ensure that any planned structures remain stable under the full range of channel flows.*"

RESPONSE: Agreed, we will move the similar statement from below into the bulleted list above.

Structures installed for the purposes of this standard must not—

- Impede or prevent passage of fish and other aquatic organisms, unless they are intended to isolate populations of native species of conservation concern as directed by State or Federal species management plans or similar guidance.
- Cause unintentional lateral migration, aggradation, or degradation of the channel.
- Hinder channel-floodplain interactions.

Plan structures to ~~be stable~~ function under ~~the full~~a wide range of channel flows.

C6: My first impression of this statement is that it is pretty broad. May want to be specific here or at least state a range. Unless you want to keep it open ended…

RESPONSE: Intent was to keep it open ended.

C36: Can this wording be changed? Maybe just say a "wide range"? - Was the intent that the structures should be stable for up to 100 year storm to match 580?

RESPONSE: We want to encourage the evaluation of habitat practices against large storms, but as an ecological science practice, we encourage but do not require the hydraulic analysis to

determine the 100-year flow and evaluate structural stability.

C37: What is the method for assessing if habitat structures can withstand certain velocities? Having a table that lists each habitat structure and the maximum velocity would be helpful. Per Table TS14J-1 in NRCS NEH Part 654, TS-14J, Use of Large Woody Material for Habitat and Bank Protection "Well-anchored structures have been successfully applied to situations with estimated velocities —2.5 m/s (D'Aoust and Millar 2000). Rootwad installations have withstood velocities of 2.7 to 3.7 m/s (Allen and Leech 1997). Engineered logjam (ELJ)-type structures withstood 1.2 m/s in a sand-bed stream (Shields, Morin, and Cooper 2004)"

RESPONSE: References are included below.

C43: This appears to be potentially at odds with the statement above about "facilitate natural geomorphic recovery". What is meant by stable? Does it mean balancing sediment in and out of the reach so there is no net aggradation/degradation? Or is it more strict than that and includes no lateral migration allowed at all? I strongly believe that we need to allow and design streams to move unless there are exceptional circumstances where infrastructure needs to be protected from lateral migration.

RESPONSE: Hydraulic and mechanical stability is an important criterion of any installed practices. It is not intended to be at odds with facilitation of geomorphic recovery.

To design large woody material for in-stream habitat, such as root wads, log vanes, log weirs, toe logs, and engineered log jams, refer to NRCS NEH Part 654, TS-14J, *Use of Large Woody Material for Habitat and Bank Protection.*

To design cross vanes, J-hooks, or vortex weirs, refer to NRCS NEH Part 654, TS-14G, *Grade Stabilization Techniques*.

To determine the minimum stone size for stability of boulder placements, refer to NRCS NEH Part 654, TS-14C, *Stone Sizing Criteria*, Ishbash Method.

C28: Add to above paragraph "Soft substrate bed boulders with deflation armor of breaker rock or small rip rap."

RESPONSE: The planner is referred to NEH Part 654 but may incorporate other design methodologies with regard to soft substrates and deflation armor.

To estimate scour depth around habitat structures, refer to NRCS NEH Part 654, TS-14B, *Scour Calculations*.

C12: Consider omitting LUNKERS or variants like jetted overhead bank covers from the list of NRCS eligible fish habitat structures. These devices may not be stable under the "full range of channel flows" or at least have a higher risk of failure than other habitat devices. LUNKERS/variants are also more costly/time consuming to build/install and are extremely prone to failure if not installed correctly. Experienced contractor needed for proper install.

RESPONSE: There are certain instances that LUNKERS can/will work so omitting them is not a good idea. All habitat structures have limitations.

To design LUNKERS~~lunkers~~, refer to NRCS NEH Part 654, TS-14O, *Stream Habitat Enhancement Using LUNKERS~~unkers~~*.

C23: LUNKERS is an acronym and should be in all caps.

RESPONSE: Change made.

A habitat structure that extends across the bottom of a stream, such as a weir or cross vane, can significantly affect the channel gradient upstream. Sediment deposition behind the structure can bury~~suffocate~~ habitat features, such as deep pools, riffles, and overhead cover, for a substantial distance.

C24: Use the term embed or bury instead of suffocate? The interstitial spaces between coarse substrate in streams is an extremely important storage compartment for allothonous inputs (leaf matter) that powers our small streams and critically important habitat for the primary consumers in streams (inverts) and some fish species. Riffles by definition are areas with relatively shallow water depth and high velocity which tends to prevent siltation/embeddedness.

RESPONSE: We agree to wording clarification; change made.

C38: However, these structures do create a large pool/scour hole. One of the biggest issues we have seen with flooding is slow shallow streams with little to no sediment transport. Those systems rarely back up sediment because they are already choked. We certainly don't want to completely sediment in a stream, but look at the effect that beaver dams have on streams. There are a whole range of different insects and macroinvertebrates living in those areas. There will be White Suckers, and some smaller browns in those areas. This creates a variety of habitats. Are we managing for all aquatic species?

RESPONSE: We agree to a point. Most of these structures do create these conditions especially in low gradient streams. Intent is to recognize this and try to limit the amount of impact.

Example: If the weir height is 2 feet above the channel bed and the gradient is 0.004 ft/ft, sediment deposition can extend 500 feet upstream. $2ft \div 0.004\frac{ft}{ft} = 500\ ft$

C7 // C25: I do not think that [the previous 2 paragraphs are] specific enough to fit here. I recommend this be moved to considerations. "Can significantly affect the channel gradient upstream…" It may or may not but it is most certainly an item that MUST be addressed in planning. I just don't think it fits in this portion of the standard. // While examples are very helpful, it seems a little curious that just this one facet of habitat enhancement has an associated example.

RESPONSE: These paragraphs will be rearranged in subsequent versions to provide more context for this example and be more applicable under the Criteria section.

If habitat structures have the potential to affect the upstream channel gradient for distance of more than 5 times the bankfull width, refer to the criteria and potential effects of the structure in Channel Bed Stabilization (Code 584).

C39: 7-12 times bankfull width in each riffle pool run is being used by other states (Iowa DNR stream restoration toolbox). Are there some situations where we should consider a ratio greater than 5?

RESPONSE: As worded, 5x bankfull width is the minimum. It is derived from Leopold, Wolman, and Miller, 1964 where a distance of 5 times the bankfull width would be about 1/2 of a meander wavelength.

CONSIDERATIONS

Restore or maintain stream habitat and channel-forming processes such as natural flow regime, meander migration, sediment transport, recruitment and storage of large wood, and stream interactions with the floodplain.

C44: Good to see [Meander migration].

RESPONSE: Thank you; this team agrees!

Incorporate riparian buffers to facilitate channel-forming processes, as well as encourage activities that promote riparian function to provide stream temperature moderation, recruitment of in-stream large

wood and fine organic matter, input of riparian nutrients, habitat for terrestrial insects and other riparian dependent species, streambank integrity, and filtration of contaminants from surface runoff (see CPSs Riparian Forest Buffer (Code 391) and Riparian Herbaceous Cover (Code 390)).

Project design should consider risks resulting from adjustment of in-stream structures. Habitat objectives can be met as structures transition or change over time; however, consider potential damage and resulting effects on offsite property, public infrastructure, and human safety from structure movement.

Specific measures that should be considered either singularly or in combination to improve stream habitat include—

- Providing aquatic organism passage upstream and downstream to the extent possible and when compatible with State and Federal species recovery or management objectives (see CPS Aquatic Organism Passage (Code 396)).
- If possible, locating stream crossings in areas with the least effect on stream geomorphic function or aquatic habitat.
- Providing screens on water pumps, diversion ditches, or any areas that are within the landowner's control, where unintentional entrainment of aquatic species is likely to occur.
- To the greatest extent possible, maintaining adequate in-stream flows to sustain diverse habitats for fish and other aquatic species, especially during critical life-history stages.
- Maintaining natural surface water, hyporheic, and groundwater interactions to the extent possible.
- Improving floodplain-to-channel connectivity for development of seasonal or permanent backwater, wetland, and off-channel habitats consistent with the local climate and stream hydrology.

  C3: How are you improving the connectivity? I see incidents of bank sloping being done to remove sediment deposits and reconnection to ya-zoo tributary areas.

  RESPONSE: It is a general consideration and rarely facilitated by stream habitat improvements under this practice standard.

- Restoring stream and riparian area function by utilizing natural materials and methodologies such as, but not limited to, flexible wood placement (unanchored, unpinned), beaver habitat restoration, spawning riffles, and boulder complexes where and when practical and feasible.

  C13: Seems contrary to overall engineered aspect of NRCS projects and additional engineering processes added to the standards in this revision exercise. Flexible wood and beaver habitat are not stable stream features and can contribute to bank failure, sedimentation, suffocation of habitat features, increased water temperature, migration barrier for fish, and abrupt changes in water levels that negatively effect dynamics/function of other installed devices or standards (overall loss on project investment).

  RESPONSE: Practices are only available if they are right for the situation. Technologies are available to stabilize habitat structures at least in the short term until perhaps other restoration elements mature. If there would be a negative impact, then the consultation should bring this out.

- Restoring or protecting riparian area and floodplain vegetation and associated riverine wetlands.
- If planting in adjoining floodplains and riparian areas, selecting plants that provide pollen and nectar for pollinators. Maximizing plant diversity in riparian areas can result in increased populations of pollinators and other terrestrial insects upon which fish feed.
- Controlling the spread of exotic plant and animal species to the greatest extent possible.
- Reducing or managing excessive runoff due to watershed development, road construction, or land- use activities that are within the landowner's control.

- Adjusting stream management actions to address the timing, intensity, frequency, and duration of recreation, grazing, planting, fertilizing, watering, or resource removal activities for the improvement and maintenance of stream and associated floodplain and riparian area habitat.
- Integrating other closely related practices to develop a comprehensive and multidisciplinary plan for the project site.

PLANS AND SPECIFICATIONS

Develop plans and specifications for each site to implement stream habitat management and improvement actions.

As a minimum, plans must include—

- Goals and objectives of the planned actions.

  C8: I think you need to include the requirement of written site and management assessments. You have to force the designer to consider all components of management and site assessment and but putting it in written form it makes the designer take the time to consider the proposed plan.

  RESPONSE: A requirement for written site and management assessments would require a list of quality criteria that may not be appropriate or worthwhile for every site, so this is left open-ended.

- A site description, including survey data that depict existing conditions and illustrate proposed changes to a subject reach's dimension, pattern, and profile.
- Data that characterize the structure and composition of the streambed and banks.

  C40: Why does the data need to be in the plan? Shouldn't it being in the design documentation be sufficient?

  RESPONSE: National language cannot be removed by the State.

- Design drawings and job sheets that document quality, quantity, placement, dimensions, and elevations of structures, including installation timing and location.

  C26: Not certain how quality is defined here.

  RESPONSE: The planner should specify the quality of materials, such as wood species and integrity, e.g. fresh cut or dead & down woody materials.

- Dimensions, species type, and minimum ballast cover for large woody material. Include the type of cover and level of compaction.

  C14: What calculations/methods are used to determine level of compaction of large woody material? Also why is level of compaction important?

  RESPONSE: The NEH technical references above provide this information. In addition, the NRCS has construction and materials specifications that may be used to complement and improve the long-term reliability of stream habitat improvement projects.

- Size and location of boulder placements and depth of embedment.

  C9: These two comments [2 previous bullets] appear to replicate the comment above. Not a

bad idea if you want to add emphasis but they do replicate the fourth bullet.

RESPONSE: The previous bullets refer to design. This bullet refers to specificity in the plan drawings for construction.

- All facilitating practices including their respective specifications and their operation and maintenance requirements.
- The dates and sequencing for improvements or management actions.
- If planting is a component of the project, include a vegetation planting plan that identifies species, stocking rates, planting dates, care of seed or other plant materials, acceptable rate of survival, replanting requirements; alternatively, use specifications outlined within the facilitating and component practices.
- Incorporation of permit requirements, if any, into the specifications, design, and operation and maintenance requirements of the practice.

C10: When are you not going to have permits? I would move this higher up on the list. Permit requirements will affect your proposed plan.

RESPONSE: Agreed, but consultation may help. In general, standard criteria are not arranged in order of importance. All criteria need to be addressed.

- Responsible party for collecting any post-construction survey data.

C27: Are frequency and timeline of post-project evaluation(s) described somewhere?

RESPONSE: That would be project specific information which is not required on every project.

OPERATION AND MAINTENANCE

Develop a detailed operation and maintenance plan for all applications that details periodic inspection and prompt repair or modification of any structures that are not meeting design objectives.

Provide monitoring guidelines for evaluating the effectiveness of the conservation actions in the short- and long-term.

Conduct postproject evaluation of stream and riparian habitat conditions using the same preproject evaluation tool (e.g., SVAP2, or other) to determine if the implemented actions have resulted in improved habitat or have fully addressed resource concerns.

Coordinate any needed repair actions in order to comply with State and Federal guidelines for protecting aquatic and terrestrial species.

REFERENCES

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