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**American Whitewater's Comments on the Chattooga
*Literature Review Report***

Respectfully Submitted May 7, 2007

The Literature Review Report lacks key concepts in the literature, which we have tried to include in these comments. Many of these comments and citations were included in greater detail in our appeal of the Sumter National Forest Land and Resource Management Plan, so their omission in this Report is surprising. Much of the discussion in the Report is accurate and well written and the problems in the report generally stem from omissions rather than errors. We hope these comments can lead to a more robust Final Literature Review Report. Perhaps the most critical failure of the Report comes in the management component. Management actions are listed without any context from the literature – rather than as solutions for specific types of problems in specific settings. A list of actions is meaningless without the context of why, when, and how the actions would be applied. While it may be beyond the scope of the Literature Review, management ideas and actions should also be discussed within the bounds of the regulatory framework found in the Wilderness Act, Wild and Scenic Rivers Act, Forest Service Manual, Forest Service Handbook, and other sources. Management ideas outside of the regulatory arena are just ideas, which may or may not be appropriate or legal.

We have organized our comments based on the organization of the Report, using the same bold titles and numbering, for your convenience.

AW Comments On: 2.1.1 & 2.2.1 Influences of Type of Recreational Use

This section is incomplete because it does not specifically discuss the concept of recreational specialization. This is extremely relevant because the level of specialization and skill required to paddle the Headwaters is quite high. Recreation specialization is characterized by a range of elements related to individual attributes of participation and setting preferences. Recreation specialization research examines widely ranging topics including, locus of control,¹ privacy orientation,² specialization, experience, social group

¹ Knopf, R.C., Peterson, G.L., Leatherberry, E.C. 1983. *Motives for Recreational Floating: Relative Consistency Across Settings*. Leisure Sciences. 5: 231-255.

² Knopf, R.C. 1987. *Human Behavior, Cognition and Affect in the Natural Environment*. In Handbook of Environmental Psychology. Stokols, D. and Altman, I. New York: Wiley.

McIntyre, N. 1989. *The Personal Meaning of Participation: Enduring Environment*. Journal of Leisure Research. 21: 167-179.

structure,³ recreation setting preferences, natural setting preferences, equipment,⁴ risk,⁵ and safety.⁶ Studies show that one's level of specialization is positively related to one's sense of place.⁷ Solitude, scenery, small group definition, and sense of place are important to every specialized group.⁸ A review of studies in recreation specialization reveals that both boating and angling take place in the context of limited resources. Both user groups must contend with environmental degradation, and the intensification of legal concerns regarding use of private lands.⁹

Based on the literature, highly specialized paddlers should be seen as a group with strong commitments to environmental stewardship, strong connection to place, high appreciation of wilderness and solitude, and as having a relatively minor environmental impact.

The discussion of interpersonal conflict and social values conflict in the report is generally good. Interpersonal conflict can be defined as the presence of an individual or group interfering with the goals of another individual or group. "Social value conflict can arise between groups who do not share the same norms¹⁰ and/or values,¹¹ independent of the physical presence or contact between the groups."¹²

The alleged conflict on the Headwaters is a social values conflict if any at all. For example, an angler representative made the following comment in support of keeping boaters out of the Headwaters: "Obviously they [boaters] just don't understand

³ Roggenbuck, E.J., Williams, D.R., Bange, S.P., et al. 1991. *River Float Trip Encounter Norms: Questioning the Use of the Social Norms Concept*. Journal of Leisure Research. 23: 133-153.

Schuett, M.A. 1995. *Predictors of Social Group Participation in Whitewater Kayaking*. Journal of Park and Recreation Administration. 13: 42-54.

⁴ Block, P.H., Black, W.C., Lichtenstein, D. 1989. *Involvement with the Equipment Component of Sport: Links to Recreational Commitment*. Leisure Sciences. 11: 187-200.

⁵ Slovic, P. 1964. *Perception of Risk*. Psychological Bulletin. 61: 220-223.

Slovic, P. 1987. *Perception of Risk*. Science. 236: 280-285.

⁶ Mackay, S. 1988. *Risk Recreation in Wilderness Areas: Problems and Alternatives*. Western Wildlands. 33-38.

McEwan, D.N. 1983. *Being High on Public Land: Rock Climbing and Liability*. Parks and Recreation. 18: 4650

⁷ Ewert, Alan., Hollenhorst, S. 1994. *Individual and Setting Attributes of the Adventure Recreation Experience*. Leisure Sciences 16: 177-191.

Bixler, R., Backlund, E. 2002. *Chattooga National Wild and Scenic River Trout Angler Substitution Study*. Clemson University, Dept of Parks, Recreation and Tourism Management.

Bixler, R., Backlund, E. 2002. *Activity of Resource Substitutes: Paddlers Using the Chattooga River*. Clemson University, Dept of Parks, Recreation and Tourism Management.

⁸ Ewert, Alan., Hollenhorst, S. 1994. *Individual and Setting Attributes of the Adventure Recreation Experience*. Leisure Sciences 16: 177-191.

⁹ Lee, R.D. *Recreational Use Statutes and Private Property in the 1990's*. 1995; *Journal of Park and Recreation Administration*. 13: 71-83

¹⁰ Ruddell, E.J., Gramann, J.H. 1994. *Goal orientation, norms, and noise induced conflict among recreation area users*. Leisure Sciences. 16: 93-104.

¹¹ Sarembe, J., Gill, A. 1991. *Value conflicts in mountain park settings*. Annals of Tourism Research. 18: 155-172.

¹² Vaske, J.J., Donnely, M.P., Wittman, K., and Laidlaw, S. (1995). *Interpersonal Versus Social-Values Conflict*. Leisure Sciences, 17, 205-222.

backcountry anglers...and our low tolerance for encounters with others with different beliefs."¹³ Researchers describe social values conflicts as follows:

“if people do not observe an event, but believe a problem situation exists, the type of conflict must stem from a conflict in social values.”¹⁴

Obviously there has not been interpersonal conflict between boaters and anglers (or other users) on the Chattooga Headwaters since there are no boaters allowed on the Chattooga Headwaters. Furthermore there are no studies documenting interpersonal conflicts between boaters and other dispersed recreationists on any of the hundreds of rivers in the region that anglers and paddlers share. Rather the alleged conflict must be based on the perception of a problem rather than on any actual event. Specifically the conflict on the Chattooga is a social values conflict created by the Sumter National Forest, which gave one group exclusive access to the river while discriminatorily banning another. This decision to favor one user group is apparently based on stereotypes of paddlers, and is not based on any studies. Studies show that if an activity is stereotyped, it may result in intolerance, regardless of situational factors.¹⁵

The Literature Review Report does not directly address the concept of stereotyping which is certainly an issue on the Chattooga. It also does not address the role that managers can play in creating or exacerbating conflicts through artificially removing some recreational users to benefit others. We have witnessed significant social values conflicts primarily in situations where a use is artificially removed and then proposed to be allowed once again. On rivers where uses exist with equal footing throughout time conflicts are far more rare – and more likely based on goal interference than on social values.

AW Comments On: 2.1.2, 2.2.2, 2.1.3 & 2.2.3 Recreational Use Encounters and Crowding & Encounter Norms

Several studies have shown that an individual’s cognitive belief that a particular backcountry situation is a problem may not correspond with that individual’s experience.¹⁶ In other words, while some users may expect the presence of paddlers to impact their experience, those impacts may not actually occur. This phenomenon is

¹³ Comment to Draft Sumter EIS.

¹⁴ Id.

¹⁵ Ivy, M.I., Stewart, W.P., and Lue, C. (1992). *Exploring the Role of Tolerance in Recreational Conflict*. Journal of Leisure Research. 24. 348-360.

¹⁶ Patterson, M.E., and Hammitt, W.E. (1990). *Backcountry Encounter Norms, Actual Reported Encounters, and Their Relationship to Wilderness Solitude*. Journal of Leisure Research. Vol. 22. No. 3. 259-275.

Ditton, R.B., Fedler, A.J., and Graefe, A.R. (1983). *Factors Contributing to Perceptions of Recreational Crowding*. Leisure Sciences. Vol. 5, No. 4. 273-288.

Hendricks, W.W. (1995). *A Resurgence in Recreation Conflict Research: Introduction to the Special Issue*. Leisure Sciences. 17. 157-158.

Owens, P.L. (1985). *Conflict as a social interaction process in environmental and behavior research: The example of leisure and recreation research*. Journal of Environmental Psychology. Vol. 5. 241-259.

critical to predicting the response of other users when paddling is restored to the Upper Chattooga. The results suggest that while some stakeholders claim zero tolerance, the impacts of paddling on their experiences may not be as severe as they anticipate.

We are curious if there are studies that have looked at the distribution of encounter tolerance levels among populations of recreationists. For example, it would seem significant if 5% of a population had a zero tolerance yet the rest of the population was tolerant of a significant number of encounters each day. This type of analysis has direct management implications regarding the target population for management. We are also curious if studies have discussed groups of recreationists exaggerating their own sensitivity for strategic gain in management decisions. It seems that all a group would have to do to justify a monopoly in some or all time and space on public lands would be to present a unified fabricated story of zero tolerance against other recreationists (based on the literature only – not including regulatory guidance to the contrary). Are their examples of this in the literature?

AW Comments On: 2.1.4 Influence of Use Experience and Place Attachment

Kinney explores several topics relating to place and specialization among Class V kayakers.¹⁷ His thesis certainly merits discussion and a citation in the Literature Review.

AW Comments On: 2.2.4: Perceptions of Wilderness and Solitude Experiences

The discussion of solitude is incomplete. We suggest the addition of several sources and concepts. Patterson and Hammitt conclude that encounters between recreationists have a minimal impact, if any, on the solitude experienced by those recreationists.¹⁸ Their conclusion is based on the fact that “solitude has a broader meaning than simply visitor encounters and perceived crowding.”¹⁹ Their research concludes that “solitude refers to remoteness, primitiveness, nonconfinement, cognitive freedom, and autonomy. In fact, many of these other aspects of solitude appear to be more important than being alone.”²⁰

The concept of cognitive freedom is recognized in USFS policy that stresses maximizing visitor freedom in the Wilderness. The boating ban is the opposite of this recommendation and concept of solitude.

¹⁷ Kinney, T.K. 1997. *Class V Whitewater Paddlers in American Culture: Linking Anthropology, Recreation Specialization, and Tourism to Examine Play*. Unpublished Graduate Thesis. Northern Arizona University.

¹⁸ Patterson, M.E., and Hammitt, W.E. (1990). Backcountry Encounter Norms, Actual Reported Encounters, and Their Relationship to Wilderness Solitude. *Journal of Leisure Research*. Vol. 22. No. 3. 259-275.

¹⁹ “Solitude need not be the opposite of social crowding” (Hammitt, 1983).

²⁰ Hammitt, W.E. (1983). *Toward and Ecological Approach to perceived crowding in outdoor recreation*. *Leisure Sciences*. 5. 309-320.

Hammitt, W.E. (1982). *Cognitive Dimensions of Wilderness Solitude*. *Environment and Behavior*. 14. 478-493.

Hammitt, W.E., Brown, G.F. (1984). *Functions of privacy in wilderness environments*. *Leisure Sciences*. 6. 151-165.

In the Record of Decision regarding our appeal of the forest plan, the reviewing officer stated that: “While there are multiple references in the record to resource impacts and decreasing solitude, these concerns apply to all users and do not provide the basis for excluding boaters without any limits on other users.” Ewert and Hollenhorst confirm that solitude is important to every specialized group.²¹ Solitude should be discussed in the context of being equally important to groups of similar levels of specialization, and differing based on expectations which are in turn based on a number of factors including location and past management.

AW Comments On: 2.3.1 Influences of Type of Recreational Use (Chattooga Specific)

Paddlers on the Upper Chattooga should be considered highly specialized recreationists and discussed in that context.²² See our comments on recreation specialization elsewhere in this document.

AW Comments On: 2.3.2 Recreational Use Encounters (Chattooga Specific)

The only point that we would like to make regarding this section is that there are no data that include paddlers as part of the mix of users on the Upper Chattooga. This should be mentioned in the Report as a data gap.

AW Comments On: 2.3.3 Influence of Use Experience and Place Attachment (Chattooga Specific)

Chattooga River paddlers exhibited a stronger sense of place than Chattooga River anglers in every category of the studies cited. In fact, one finding of the Bixler study characterized Chattooga River angler’s motivation for fishing on the Chattooga in the following manner: “For a significant portion of the respondents, trout fishing may be a means of expressing their [socio-economic] status,” not finding a sense of place.²³ This is a significant finding that is not referenced in the Report.

We would like to point out that paddlers have had almost no ability to develop Place Attachment on the Upper Chattooga due to the artificial ban on their preferred activity. Place bonding occurs most strongly through engaging in a preferred activity, especially for highly specialized recreationists. Comparisons of Place Attachment between paddlers and other permitted users must be tempered by this factor. What can be said is that USFS management has eviscerated paddlers’ place attachment on the Upper Chattooga for over a generation. Allowing paddling in the future may or may not

²¹ Ewert, Alan., Hollenhorst, S. 1994. *Individual and Setting Attributes of the Adventure Recreation Experience*. Leisure Sciences 16: 177-191.

²² Kinney, T.K. 1997. *Class V Whitewater Paddlers in American Culture: Linking Anthropology, Recreation Specialization, and Tourism to Examine Play*. Unpublished Graduate Thesis. Northern Arizona University.

²³ Bixler, R., Backlund, E. 2002. *Chattooga National Wild and Scenic River Trout Angler Substitution Study*. Clemson University, Dept of Parks, Recreation and Tourism Management.

occasionally decrease other users' connection with the place, but it would absolutely and vastly increase paddlers' connection with the place. Allowing all uses would rebalance an unequitable impact on place relationships on the Chattooga. This concept should be pointed out in the Report.

AW Comments On: 2.4.1 Identification and Selection of Indicators

If the limits of acceptable change methodology is to be applied equitably, the USFS must acknowledge the baseline for any changes must include paddling on the Upper Chattooga (without artificial limits). With that baseline, uses may be limited following protocol. There exists no reason for the current boating ban, and the ban should therefore not be considered part of the baseline. Part of this correction for past management must include acknowledgement that the perspective and stated tolerance levels of existing users are artificially skewed and that some resetting of expectations is totally appropriate. Paddlers' use preferences must also be considered.

AW Comments On: 2.4.2 Use Limits & 2.4.3 Other Factors (including Zoning)

The following statement is erroneous: "Vaske et al (2006) states that zoning incompatible users to different locations can be an effective method of managing conflict that stems from interpersonal conflict. Furthermore, when the source of conflict is a difference in values, education may be required." Vaske did not state that education may be required *in addition to* zoning as the wording "furthermore" infers. They are in fact two different solutions for two different types of conflicts. From Vaske et al:

Understanding these sources of conflict (interpersonal conflict versus conflicts in social values) is important for natural resource managers because the solution to the conflict depends on the cause of the problem. Zoning, for example, may reduce conflicts stemming from interpersonal conflict because the user groups are physically separated. On the other hand, zoning is likely to be ineffective when conflicting values are involved (Ivy, *et al.*, 1992²⁴, Owens, 1985²⁵). Because social interaction is not necessary for this type of conflict to occur, physically separating users will have little influence. In these situations, education may be more effective.²⁶

Vaske asserts that "the potential for interpersonal conflict increases with increased visitation. On the other hand, for individuals who fundamentally disagree with an

²⁴ Ivy, M.I., Stewart, W.P., and Lue, C. (1992). *Exploring the Role of Tolerance in Recreational Conflict*. Journal of Leisure Research. 24. 348-360.

²⁵ Owens, P.L. (1985). *Conflict as a social interaction process in environmental and behavior research: The example of leisure and recreation research*. Journal of Environmental Psychology. Vol. 5. 241-259.

²⁶ Vaske, J.J., Donnely, M.P., Wittman, K., and Laidlaw, S. (1995). *Interpersonal Versus Social-Values Conflict*. Leisure Sciences, 17, 205-222.

activity..., these conflicts in values should not vary with visitation.”²⁷ In other words, allowing boating on the Headwaters would not exacerbate the alleged social values conflict that may be present. He concludes that “when the source of conflict is differences in values, however, zoning is not likely to be very effective.” “In this situation educational efforts...may be more effective.”²⁸

Recreational specialization research shows that zoning will do nothing to eliminate the perceived conflict on the Chattooga River, and will instead exacerbate conflict. This research also shows that education, not zoning, is the best means of reducing conflict.

Even if a conflict between boaters and other users did exist, education—not zoning—would be the best (and only) way to resolve that conflict.²⁹ Dyke and Rule found that people are less likely to experience anger if they are aware of the roots of the behavior that would have otherwise angered or frustrated them.³⁰ Ramthun accordingly suggests that “interpretive efforts that help users to understand the behaviors, motivations, and land use needs of other user groups may reduce perceptions of conflict.”³¹ Examples of this type of education on the Chattooga would include educating anglers on paddlers’ river stewardship efforts, the compatibility of paddling use, concern with safety, and paddlers’ enjoyment of solitude. Ramthun also states that “while it is obviously necessary to establish some behavioral protocols, it may be equally necessary to promote understanding and acceptance for the needs and motives of different user groups. If these educational efforts emphasize that different user groups have many similarities, especially regarding relationship to setting, perhaps fewer biased evaluations will occur.”³²

Ramthun concludes his study as follows:

An emphasis on understanding and acceptance, if successful, would help to redefine the social situation in outdoor recreation settings. At present, other user groups are often viewed by recreationists as a source of interference and competition. By emphasizing tolerance in our interpretive efforts, we may encourage the people in different user groups to see each other simply as fellow travelers in the outdoors.”³³

²⁷ Vaske, J.J., Donnelly, M.P., Wittman, K., and Laidlaw, S. (1995). *Interpersonal Versus Social-Values Conflict*. *Leisure Sciences*, 17, 205-222.

²⁸ Id.

²⁹ Vaske et al’s recommendation that education be utilized to resolve social values conflict like those on the Chattooga is critical to the resolution of this issue and is well supported by other literature.

³⁰ Dyck and Rule, 1978 as cited in Ramthun, R. 1995. *Factors in User Group Conflict Between Hikers and Mountain Bikers*. 159-169.

³¹ Ramthun, R. 1995. *Factors in User Group Conflict Between Hikers and Mountain Bikers*. 159-169.

³² Id.

³³ Ramthun, R. 1995. *Factors in User Group Conflict Between Hikers and Mountain Bikers*. 159-169.

This conclusion is consistent with the literature and USFS policy and shows that education, not zoning, is the most appropriate means of resolving any alleged user conflicts on the Chattooga.

AW Comments On: 2.5 Key Findings and Management Considerations

The management considerations present a list of management options – yet fails to mention that these options exist in a procedural framework clearly defined by the regulatory arena that decisions take place in. These menu items may all exist in the literature, but in a regulatory context - or in their context in the literature - many of them are totally inappropriate in many situations. Without context, this section is meaningless.

AW Comments On: 3.1.2 Flow-Recreation Issues in the Chattooga Corridor

This section is missing the only robust methodology capable of gathering the kind and quality of data sufficient for decision making on the Chattooga. This methodology has been reiterated by American Whitewater numerous times in comments. It simply entails permitting some large number of people to paddle the river should they choose to do so, and surveying those paddlers via a mail or online survey tool. This methodology allows paddlers to opportunistically paddle the river during stochastic high flow periods, gathers a large sample size of real users at the conditions they seek, and costs virtually nothing to implement. Studies such as these have been carried out on West Rosebud Creek (MT), the Cheoah River (NC), the Crooked River (OR), the Sultan River (WA), and many others. The lack of this obvious and ideal methodology in the Report is a glaring omission.

Expert panels are often capable of gathering data sufficient for management decisions as stated in the Report. Single flow assessments however are rarely if ever sufficient to base long term management decisions on. Typically, single flow assessments are used to determine if a multiple flow assessment is justified based on reach quality, or needed based on the certainty of responses. Time and time again during flow studies the estimates made during single flow assessments are either found to be wrong or are significantly refined through a multiple flow assessment. The limitations of a single flow assessment should be explained in detail.

AW Comments On: 4.0 RECREATIONAL USE EFFECTS ON TRAIL AND SITE RESOURCES

We would like to see more discussion of the benefits of trail use, or at least an acknowledgement of it. Most of the great conservationists of our time, and most of the voters that have supported great conservation initiatives developed a personal relationship with the natural world on a trail of one kind or another (including water trails, i.e., rivers). Outdoor recreation is one of the primary drivers of resource protection and trails are the gateway to outdoor recreation experiences including hiking, climbing, paddling, fishing, hunting, and camping. In an era when an increasingly smaller percentage of people are visiting national parks and other public lands, it would serve us all well to acknowledge

that people are welcome to responsibly enjoy public lands – not discouraged from doing so.

AW Comments On: 5.1.2 Potential Influences of Recreation Activity Type and Behavior

There are several omissions in this section. First, there is no discussion of hunting yet hunting is discussed in some detail in other places in the document. Second, the section regarding fishing is incomplete. The Report states that stocking impacts are being debated. In fact, while there is always debate in science, there is a great deal of scientific consensus that stocking has numerous definable and predictable impacts. Please see the following references as a starting point regarding the accepted impacts of fish stocking and other angling related actions:

- Trout stocking impacts amphibians³⁴⁻³⁵
- Trout stocking impacts entire freshwater food webs³⁶⁻³⁷⁻³⁸
- Trout stocking causes loss of genetic diversity and population changes³⁹⁻⁴⁰
- Trout stocking displaces native trout⁴¹⁻⁴²

³⁴ Pilliod, David S.; Peterson, Charles R. 2000. Evaluating effects of fish stocking on amphibian populations in wilderness lakes. *In*: Cole, David N.; McCool, Stephen F.; Borrie, William T.; O'Loughlin, Jennifer, comps. Wilderness Science in a Time of Change Conference—Volume 5: Wilderness Ecosystems, Threats, and Management; 1999 May 23-27; Missoula, MT. Proceedings RMRS-P-15-VOL-5. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 328-335. Leopold Publication Number 406.

³⁵ Pilliod, David S.; Peterson, Charles R. 2001. Local and landscape effects of introduced trout on amphibians in historically fishless watersheds. *Ecosystems*. 4(4): 322-333. Leopold Publication Number 446.

³⁶ Yang, Y.F. et al. (2005) Effects of fish stocking on the zooplankton community structure in a shallow lake in China. *Fish. Manage. Ecol.* 12, 81–89

³⁷ Lisa A. Eby, W. John Roach, Larry B. Crowder and Jack A. Stanford. 2006. Effects of stocking up freshwater food webs. *TRENDS in Ecology and Evolution* Vol.21 No.10.

³⁸ Scavia, D. et al. (1986) Influence of salmonine predation and weather on long-term water quality trends in Lake Michigan. *Can. J. Fish. Aquat. Sci.* 43, 435–443

³⁹ Simon, K.S. and Townsend, C.R. (2003) Impacts of freshwater invaders at different levels of ecological organisation, with emphasis on salmonids and ecosystem consequences. *Freshw. Biol.* 48, 982–994.

⁴⁰ Dunham, J.B. et al. (2004) Assessing the consequences of nonnative trout in headwater ecosystems in Western North America. *Fisheries* 29, 18–24

⁴¹ Nakano, S. et al. (1998) Competitive interactions for foraging microhabitat among introduced brook charr, (*Salvelinus fontinalis*) native bull charr (*S. confluentus*) and westslope cutthroat trout (*Oncorhynchus clarki lewisi*) in a Montana stream. *Environ. Biol. Fishes* 52, 245–355

⁴² Gunckel, S.L. et al. (2002) Effect of bull trout and brook trout interactions on foraging habitat, feeding behavior growth. *Trans. Am. Fish. Soc.* 131, 1119–1130

- Trout stocking can reduce or eliminate other species⁴³
- Trout stocking can impact macroinvertebrates^{44_45_46}
- Trout stocking can impact riparian plants and animals^{47_48_49_50}
- Lead tackle impacts aquatic and terrestrial animals^{51_52_53_54}
- Monofilament line can impact aquatic and terrestrial animals⁵⁵
- Lost fishing hooks can impact aquatic and terrestrial animals as well as other recreationists⁵⁶.
- Fishing can result in direct mortality to fish, both intentionally as take, and unintentionally⁵⁷.

⁴³ Simon, K.S. and Townsend, C.R. (2003) Impacts of freshwater invaders at different levels of ecological organisation, with emphasis on salmonids and ecosystem consequences. *Freshw. Biol.* 48, 982–994

⁴⁴ Gliwicz, Z.M. and Rowan, M.G. (1984) Survival of *Cyclops abyssorum taticus* (Copepoda, Crustacea) in alpine lakes stocked with planktivorous fish. *Limnol. Oceanogr.* 29, 1290–1299

⁴⁵ Nakano, S. and Murakami, M. (2001) Reciprocal subsidies: Dynamic interdependence between terrestrial and aquatic food webs. *Proc. Natl. Acad. Sci. U. S. A.* 98, 166–170

⁴⁶ 37 Baxter, C.V. et al. (2005) Tangled webs: reciprocal flows of invertebrate prey link streams and riparian zones. *Freshw. Biol.* 50, 201–220

⁴⁷ Nakano, S. and Murakami, M. (2001) Reciprocal subsidies: Dynamic interdependence between terrestrial and aquatic food webs. *Proc. Natl. Acad. Sci. U. S. A.* 98, 166–170

⁴⁸ 37 Baxter, C.V. et al. (2005) Tangled webs: reciprocal flows of invertebrate prey link streams and riparian zones. *Freshw. Biol.* 50, 201–220

⁴⁹ Baxter, C.V. et al. (2004) Fish invasion restructures stream and forest food webs by interrupting reciprocal prey subsidies. *Ecology* 85, 2656–2663

⁵⁰ Knight, T.M. et al. (2005) Trophic cascades across ecosystems. *Nature* 437, 880–883

⁵¹ Eisler, Ronald, U.S. Fish and Wildlife Service. "Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review." Biological Report 85(1.14), *Contaminant Hazard Reviews*, April 1988.

⁵² Scheuhammer, A.M., Money, S.L., Kirk, D.A., Donaldson, G. "Lead fishing sinkers and jigs in Canada: Review of their use patterns and toxic impacts on wildlife." Occasional Paper Number 108, Canadian Wildlife Service, March 2003.

⁵³ Sidor, Inga F., Pokras, Mark A., Major, Andrew R., Poppenga, Robert H., Taylor, Kate M. Miconia, Rose M. "Mortality of Common Loons in New England, 1987 to 2000." *Journal of Wildlife Diseases*, Vol. 39, No. 2, pp. 306-315.

⁵⁴ Scheuhammer, A.M., Norris, S.L. "A review of environmental impacts of lead shotshell ammunition and lead fishing weights in Canada." Occasional Paper Number 88, Canadian Wildlife Service, August 1995.

⁵⁵ This is a common issue discussed in the grey literature, and the Report authors should research this in the peer reviewed literature.

⁵⁶ This is a common issue discussed in the grey literature, and the Report authors should research this in the peer reviewed literature.

- Wading may impact macroinvertebrates⁵⁸
- Trout stocking artificially increases angler interest in the stocked streams.

American Whitewater's Conclusions

We hope that the USFS finds these comments useful, and can enhance their literature review with the sources and information we have shared.

Thank you for considering these comments,

A handwritten signature in black ink, appearing to read "Kevin Colburn". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Kevin Colburn

⁵⁷ Aaron Bartholomew and James A. Bohnsack. 2005. A Review of Catch-and-Release Angling Mortality with Implications for No-take Reserves. *Reviews in Fish Biology and Fisheries*. Volume 15, Numbers 1-2 / February, 2005. 129-154

⁵⁸ Kick-netting is a widely used method for causing unintentional drift in stream macroinvertebrates for the purpose of sampling, inferring that walking and shuffling feet on the stream bottom for any purpose would have the same effect. To learn more about the methodologies, see Cummins, K.W and R.W. Merritt. 1996. *Aquatic Insects of North America*. Third edition. Kendall Hunt Publishing.