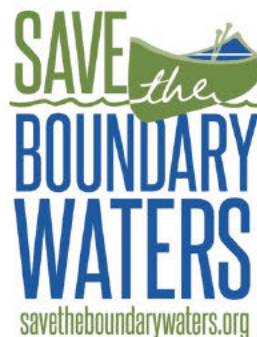




The Impacts of Mining on the Character of a Wilderness Landscape: Considerations for Federal Decision-Making

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September 14, 2015

Prepared for Northeastern Minnesotans for Wilderness



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When decisions are made that will determine the future character of a location or landscape, decision makers often focus on potential harm to specific natural resources. What will the impact of the change in land use be on water flowing out of or through the area? What will the impact be on ambient air? What will the impact be on wildlife that currently live in or travel through the area? What might the state, nation, or world lose in terms of biological diversity if the ecosystems that currently exist there are destroyed?

Another set of questions centered on human activities finds its way into (and often overtakes) the discussion. What might the change in land use mean for the local economy? How much money stands to be made? Into whose hands will that money fall? What will happen to the human activities that the land currently supports, whether they be economic (timber harvest, resort businesses), recreational (hiking, snowmobiling), or subsistence (hunting, berry gathering)?

As important as all these questions are, they miss a fundamental aspect of changes in the use of land. The missing question might be phrased, “How will this change in land use affect people’s life experience?” Admittedly, most land use changes do not rise to this level of impact. A shopping mall within city limits where a forested lot used to be may affect people who once felt a lift in mood or calming of spirit at the daily sight of a bit of nature in the midst of the city, but after all the mall is in a location where people are already accustomed to nature’s absence.

Some places, however, are so important to people’s sense of what is right and good and of ultimate value that the character of the area becomes – or should become – a critical consideration in decisions about land use changes that will affect that character. The Boundary Waters Canoe Area Wilderness and the Birch Lake/South Kawishiwi River that flow into it are such a place. To transform this area from what it is today into an industrial mining district would amount to a change in the character of a landscape that would affect the experience and psychological well-being of tens—or even hundreds—of thousands of people in a way that simply cannot be captured by a discussion of ecological and economic considerations.

This paper looks at several aspects of the consideration of the character of a place and what it means to human beings in the context of federal agency decision making, with an emphasis on the South Kawishiwi and Boundary Waters Canoe Area Wilderness (BWCAW) and the changes that would occur with mining in the area. First, we provide support for the statement that the character of the area is of such importance to people who live and travel there that changes of the nature required by mining would affect something fundamental to

their sense of well-being. Second, we review the legal support for making this a primary consideration in any decisions that will result in such changes, and provide historical examples of federal agency decisions that took account of similar considerations. Third, we review current thinking in the field of ecological risk assessment that supports and provides a context for such considerations in National Environmental Policy Act (NEPA) analysis or other forms of environmental review. Finally, we discuss several inevitable impacts of industrial mining that would result in a transformation of the character of the South Kawishiwi area and would significantly impact the wilderness character of the adjacent BWCAW.

I. The Human Value of the Northern Canoe Country

It would be difficult to overstate the importance of the Boundary Waters Canoe Area Wilderness to the American people. The BWCAW receives more than 250,000 visitors a year, making it the most popular wilderness area in the country. This is especially remarkable as most visitors need a canoe or other watercraft to access it. The Superior National Forest as a whole is one of the country's most-visited national forests, with four-and-a-half million visitors annually.¹

But numbers do not begin to explain what the BWCAW and other waterways of the Superior National Forest mean to people. A simple Internet search yields hundreds of stories about BWCAW trips, many of which reveal great impacts on the writer. One such story ends, "Just being out in the wilderness is sacred. There's something special about the Boundary Waters; my friends will go home different people. We're walking away full."²

Or consider this statement, from Nan Stokes of the Minnesota Episcopal Environmental Stewardship Commission:

Authors write about the sacredness of space and time and those "thin places" on our planet where Heaven seems to touch Earth and you find yourself aware of the Holy, and filled with the Spirit. These moments of spiritual awareness are enhanced, and perhaps even caused by finding ourselves in the midst of great natural beauty, where silence is the music and the sun or the moon and stars are the light to show us the soft earth and sky colors. In northern Minnesota we are blessed to have one such thin place, and the opportunity to breathe in that Spirit. The Environmental Stewardship Commission believes that the Boundary Waters Canoe Area Wilderness is sacred ground here in the Diocese of Minnesota. It presents creation to us in just this way – a window to the kingdom of God – a glimpse of heaven here in this lifetime. Consider this, and be more aware of God's presence in all of creation, and your place in it.³

¹ Steve Bailey, *The Boundary Waters: A Place Apart*, American Forests (Autumn 2011), <https://www.americanforests.org/magazine/article/boundarywatersaplaceapart/> (accessed June 9, 2015).

² *Id.*

³ Nan Stokes, Minnesota Episcopal Environmental Stewardship Commission, *Thin Places* (1996), <http://www.env-steward.com/boundary/nan9610.htm> (accessed June 9, 2015).

When we think of iconic places, we often think of a particular view, the grandeur of mountains and canyons. But there is no doubt that the quieter beauty of the shifting scenery and seemingly endless water trails of Minnesota's canoe country strikes as deep a chord in the human imagination as many more imposing sights. Paul Schurke, an arctic explorer and BWCAW wilderness guide, believes that the scale of the scenery in the Boundary Waters actually makes this place even more compelling to the people who travel here. Schurke states, "The BWCA is unique amongst wilderness areas in that the beauty and grandeur are much more accessible to human beings. In many wilderness areas, the scale is superhuman; the mountains are spectacular, but they are also unreachable. The BWCA is wilderness on a human scale; you are a part of it every step and stroke of the way."⁴

Kevin Proescholdt captures something of the feeling that comes upon so many in a trip in the BWCAW:

Throughout this entire setting pervaded the great wilderness silence, the sound of a land removed from man-made noise, with only the natural sounds of forest and water. A faint loon call reached us from far to the south, and a ruby-crowned kinglet called frenziedly from nearby in its repeated triplet call. A blue jay scolded from through the woods, and water dripped from the trees to the lake surface of perfectly mirrored reflections below. A sense of magic fell upon us and we floated wordlessly in silence. This was the wilderness spell we sought, this the wilderness so increasingly hard to find in the canoe country.⁵

Part of what makes the BWCAW so important to people results from its designation as wilderness, which has left it free of roads and automobiles, houses and other development. Spending time in such untouched places can leave a deep impression on the human psyche and character. As Dr. John Hendee put it, "Wilderness is used for growing people, as well as growing natural resources."⁶

While wilderness has meant many things to many cultures and generations over the centuries,⁷ the very existence of large, wild, untrammelled natural areas increases in importance as the continent becomes increasingly populated and developed. A good deal of psychological research has been done to assess that importance. In 1987, researchers systematically categorized the types of benefits that are derived from wilderness based on the state of

⁴ Appendix A, Declaration of Paul Schurke (July 5, 2015).

⁵ Kevin Proescholdt, *Glimpses of Wilderness* 6 (2015).

⁶ Ewert, A., & Mcavoy, L. *The Effects of Wilderness Settings on Organized Groups: A State-of-Knowledge Paper*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O'Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry* 16, U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

⁷ Driver, B., Nash, R., & Haas, G. *Wilderness Benefits: A State-of-Knowledge Review*. In R. C. Lucas (Ed.), *Proceedings—National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions*. U.S. Dept. of Agriculture, Forest Service, Intermountain Research Station (1987); Nash, R. *Wilderness and the American Mind* 425 (1982).

knowledge at that time. Three broad classes of benefits emerged: social (“realized by individuals collectively that accrue to society or subcultures of society”), inherent/intrinsic (“accrue to plants and animals from wilderness preservation whether or not humans benefit currently or in the future”), and personal (“realized by individuals whether or not they can be aggregated across individuals”).⁸ In turn, personal and social benefits can be accrued by both on-site and off-site users—that is, one does not have to ever personally visit a wilderness area to benefit from its existence. From a broad spectrum of benefits identified in supporting literature, the following six were found to be the most central values of wilderness:

1. Preservation of representative national ecosystems and maintenance of species diversity as laboratories for links with the past, learning, and scientific research, and as models for appreciating the complex, interactive, supportive, and competitive forces that maintain life without the need for human assistance.
2. Spiritual values that capture the themes of natural cathedrals, understanding unity and continuity, celebrating the creative forces behind life, and realizing the spiritually sustaining and cleansing power of natural areas.
3. Esthetic values that go beyond scenic beauty to the sublime—to the notions of awesomeness, majesty, and overwhelming esthetic impact.
4. Inherent/intrinsic values which, if they do not adequately articulate, at least gently hypothesize that non-human organisms have their places on Earth and that perhaps even inanimate objects have the right to exist. Wilderness preservation, as a form of restraint, helps temper the tendency of aggressive humankind to conquer and subdue the entire Earth.
5. Historical and current cultural values nurtured by wilderness, such as freedom, pride one’s nation’s material bounty and splendor, creative inspiration, and maintenance of a part of the past out of respect for what has been.
6. Specific types of recreational use that depend on wilderness settings, including the quest for self-sufficiency, particular types of challenge and skill-testing, and recreation and therapeutic benefits related to being in a tranquil, serene, primitive area with few other people around.⁹

Supported by the best scientific literature generated through the mid-1980s, this list conveys important values. It does not, however, include the full range of central values of wilderness as we understand them today. Additional benefits that have emerged from new

⁸ *Id.*, Driver et al. at 297.

⁹ *Id.* at 314.

research include spiritual growth, improved ecological learning, maintenance and promotion of mental and physical health, perception of one's sense of fit in the grand scheme of things, and promotion of environmental stewardship.¹⁰ Subsequent studies also support a "wider appreciation and better understanding of the benefits of wilderness to the off-site users" including "the proximity of wilderness and other natural amenities as a source of community pride and satisfaction, the economic value of wilderness-related tourism and, very importantly, the species diversity, sustainable ecosystem and natural laboratory values of wilderness."¹¹ Importantly, research also revealed strong evidence that non-users benefited from and supported wilderness preservation:

Several studies have documented that only small percentages (usually not more than 16%) of the population of the United States actually visit wilderness areas. But surprisingly, 85-90% (with the percentages varying from study to study) of the respondents to at least three national or regional household surveys reported that they valued the existence of wilderness and were willing to pay reasonable taxes for such—and remember that no more than 16% said they actually had visited wilderness areas.¹²

Personal benefits of wilderness by those who do travel there are wide-ranging. Included in these benefits are developmental benefits (e.g., change in self-concept, self-actualization, skill development, etc.), along with therapeutic, physical health, self-sufficiency, social identity, educational, spiritual, esthetic, creativity, and symbolic benefits.¹³ To someone experienced in wilderness travel, this list will feel familiar. For instance, a common outcome of wilderness travel is to gain confidence by learning new skills and overcoming challenges once thought impossible.¹⁴ Relating with others day after day while trying to accomplish a common goal helps individuals develop a sense of identity and belonging in a group, so much so that the creation of community often becomes a central theme in a wilderness experience.¹⁵ A study of outfitters and guides finds that even those tied to wilderness for commercial gain saw the powerful, positive role wilderness plays in people's lives.¹⁶

¹⁰ Roggenbuck, J. W., & Driver, B. L. *Benefits of Nonfacilitated Uses of Wilderness Purposes*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O'Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry*; U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

¹¹ *Id.* at 33.

¹² *Id.* at 35.

¹³ *Supra* n.7, Driver et al.

¹⁴ Arnould, E. J., & Price, L. L. *River magic: extraordinary experience and the extended service encounter*. 20 *Journal of Consumer Research* 24–45 (1993).

¹⁵ *Id.*; *supra* n.7, Driver et al., and n. 10.

¹⁶ Parker, J. D., & Avant, B. *In Their Own Words: Wilderness Values of Outfitter / Guides*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O'Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry*, U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

Research shows strong evidence that wilderness experiences can positively benefit individuals' self-concept, self-esteem, and outlook on life. For instance, a 1986 study found that "individuals' developing perceptions [of nature] had direct consequences on their views of their own abilities and interests; the experience seemed to shape their definitions of who they were as individuals."¹⁷ A 1993 study of extended river rafting trips on the Colorado River showed that renewal of self and personal growth drives participants' trip satisfaction. Skill development plays a role in the development of self-esteem and personal growth, as participants are able to see concrete manifestations of their increased mastery throughout the experience.¹⁸ A 1999 study demonstrated that three prominent wilderness-based programs (Outward Bound, National Outdoor Leadership School, and the Student Conservation Association) contributed to significant positive changes among their participants.¹⁹ Changes included "a life-changing event, increased interest in school, physical and mental fitness, positive behavioral changes and a stronger commitment to conservation and the environment." Many of these changes persisted after the participants returned home.

Re-conceptions of self, including gaining knowledge than one can learn skills and perform tasks believed to be difficult or impossible, can in turn lead to improved self-efficacy. Self-efficacy can be defined as "our beliefs about our ability to execute control over our own level of functioning and the events that affect our lives."²⁰ This attribute is thus fundamental to the ability to set and accomplish goals, pursue positive changes, and otherwise lead an effective life. A study of 68 participants in 21-day wilderness courses administered by the Voyageur Outward Bound School in Minnesota demonstrated that wilderness travel has a significant and lasting impact on individuals' sense of self, increased feelings of competence, and acceptance of failure as learning opportunity. Follow-up interviews with participants showed that these changes were ongoing, as "all those interviewed stated that they used the wilderness experience to help make decisions about their lives." Finally, participants made clear that the wilderness itself (the "place") played a large role in their personal development and helping define themselves.²¹

Wilderness also appears to play a role in triggering peak experiences, a fundamental component of Abraham Maslow's description of the highest levels of human well-being. Maslow described peak experiences as brief moments of ultimate happiness that are often

¹⁷ Talbot, J. F., & Kaplan, S. *Perspectives on wilderness: re-examining the value of extended wilderness experiences*. 6 *Journal of Environmental Psychology* 177–188 (1986).

¹⁸ *Supra*, n.14.

¹⁹ Kellert, S. *A national study of wilderness experience*. In R. Wiansky, S. Reed, *New study demonstrates outdoor experience may prove life changing to adolescents, help solve education woes*, IX *The Outdoor Network* 1, 27 (1999).

²⁰ Paxton, T., & McAvoy, L. *Social Psychological Benefits of a Wilderness Adventure Program*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O'Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry* 202, U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

²¹ *Id.* at 202-204

highly meaningful or carry insight for the individual experiencing them.²² In a study of Australian wilderness users, researchers sought to add to the already well-documented psychological benefits of nature by defining and identifying both the perceived and physical characteristics of wilderness that most commonly trigger peak experiences. They found evidence that “aesthetic qualities of the wilderness setting and being away from the pressures, people, distractions, and concerns of the human-made world were key elements in . . . peak experiences.”²³

These experiences often played an important role in the lives of wilderness travelers:

Just over half of the participants in this study noted that their peak experience in wilderness was significant to their life in some way and that the restorative elements of the setting (solitude, absence of time constraints, lack of human-made intrusions, and distractions) were important in allowing them time and space to think and reflect. Meaning and purpose were articulated in various ways, including finding meaning in suffering, the attainment of life-long goals, acknowledging the existential limits of human life, and enjoying the nonmaterial pleasures of wild nature.²⁴

Psychological benefits can also emerge more gradually during wilderness travel. While participants in the Outdoor Challenge Program in Michigan learned backcountry skills very quickly, the psychological benefits evolved gradually during two weeks of backpacking. One theme related to new perspectives, including “a sense of altered priorities—how individuals see themselves and the everyday environment in a new way,” especially due to the awesomeness of the wilderness and the need to overcome daily challenges. A second theme involved the peace and tranquility that result from the quietness of nature and the removal of daily stress, responsibilities, and disturbances felt in society.²⁵ Wilderness was found to play a key role in inspiring these benefits:

The role that wilderness plays is expressed not only in the fact that such reflections occur, but in their content as well. Participants discover that they can cope with an environment that they considered difficult and challenging. They find that they feel competent in an environment that has come to take on considerable importance for them. Yet at the same time, they feel small relative to the forces they see around them. They abandon any illusion of control in favor of a less dominant but more trusting relationship and in the process they are likely to reassess their place in the world and their relationship to the natural

²² McDonald, M. G., Wearing, S., & Ponting, J. *The Nature of Peak Experience in Wilderness*. 37 *The Humanistic Psychologist* 4 (2009).

²³ *Id.* at 370.

²⁴ *Id.* at 383.

²⁵ Kaplan, S., & Talbot, J. F. *Psychological Benefits of a Wilderness Experience*. *Behavior and the Natural Environment* (Human Behavior and the Environment Vol. 6) 182 (1983).

world in particular. In all these respects the wilderness environment plays a specific content role in the contemplative process of the participants.²⁶

As research methods evolve, it has become possible to test for psychological and cognitive benefits of nature and wilderness in more quantitative (and creative) ways. For instance, researchers recently used mobile electroencephalography (EEG) recorders to demonstrate that subjects experienced positive emotional changes (increased meditation and reduced frustration, engagement/alertness, and long-term excitement) when transitioning from an urban street to green space.²⁷ Research also shows cognitive benefits from spending multiple days in nature, from increased proofreading performance to improved recognition of nonverbal emotional cues. Additionally, twenty-five undergraduates participating in a 6-day wilderness canoe expedition in the Boundary Waters Canoe Area Wilderness performed significantly better on an objective test of creativity than an indoor control group. Because the groups did not perform significantly differently before the test group was immersed in the wilderness, these findings suggest that the wilderness experience directly influenced the burst of creativity.²⁸ These evolving methods continue to demonstrate the importance of nature and wilderness immersion for a variety of psychological and cognitive benefits.

Spiritual benefits of wilderness, though difficult to quantify, are recorded repeatedly by researchers. One research team noted the diversity of spiritual interactions with wilderness, and identified spiritual benefits as “among the most special and valued of all wilderness benefits.”²⁹ Wilderness experiences facilitate encounters with spiritual concepts such as the enduring, the sublime, beauty, competence, experience of peace, and self-forgetting.³⁰ Studies show that users experience these benefits both during and after wilderness excursions. For instance, wilderness travel had “a profound effect” on two groups of women traveling in either the Boundary Waters Canoe Area Wilderness or Grand Canyon National Park. Many of the women reportedly appeared “both enlivened and mystified by being in such an untamed and ‘wild’ landscape,” feeling that the experience was “beyond words, or more accurately, that words simply could not adequately capture what it was when they were fully experiencing their own spirituality.”³¹ Wilderness is so well-suited to contemplating spirituality and related fields that professors take undergraduates into the wilderness to “inspire them to dedicate themselves to a passionate and personal search for ethical wisdom.”³² Today’s wilderness users

²⁶ *Id.* at 198.

²⁷ Aspinall, P., Mavros, P., Coyne, R., & Roe, J. *The urban brain: analysing outdoor physical activity with mobile EEG*. 49 *British Journal of Sports Medicine* 4 (2013).

²⁸ Ferraro, F. M. *Enhancement of Convergent Creativity Following a Multiday Wilderness Experience*, 7 *Ecopsychology* 1 (2015).

²⁹ *Supra* n. 10 at 43.

³⁰ Johnson, B. *On the Spiritual Benefits of Wilderness*. 8 *International Journal of Wilderness* 3 (2002).

³¹ Fredrickson, L. M., & Anderson, D. H. *A Qualitative Exploration of the Wilderness Experience as a Source of Spiritual Inspiration*. 26 *Journal of Environmental Psychology* (1999).

³² Fredrickson, L. M., & Johnson, B. L. *Wilderness : A Place for Ethical Inquiry*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O’Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry*; U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

connect to the same spirit that inspired the likes of John Muir and Edward Abbey to proclaim the majesty of nature's cathedrals.

The potential benefits of wilderness travel are immense, and organized programs from the Boy Scouts to licensed therapy practices take advantage of wild settings to achieve a variety of developmental outcomes for youth. Instructors at the Voyageur Outward Bound School, which operates a wilderness base on the edge of the Boundary Waters Canoe Area Wilderness, often refer to the wilderness setting as “the third instructor,” indicating that the place plays as vital role in the students’ education as the two flesh-and-blood instructors. While most recreational wilderness programs cater to people seeking a wilderness experience, wilderness therapy programs accept clients who are referred (or mandated) by mental health professionals, schools, or court systems.³³ Wild settings drive healing outcomes in these programs, which can be defined as “a sophisticated treatment intervention based on an integrated theory of wilderness programming and eclectic therapeutic techniques, serving troubled adolescents who are not being reached by traditional therapeutic approaches.”³⁴

Many wilderness therapy programs share a cleansing phase, a personal and social responsibility phase, and the transition and aftercare phase, all of which are supported by the wilderness settings in which participants travel.³⁵ Expected outcomes include development of self-concept, knowledge and skills gained, realizations of personal behavior, and strengthened family relations. Like recreational wilderness programs, the wilderness therapy field is diverse. Some programs focus on chemical dependency issues, while others have specific purposes such as enhancing the employability of socioeconomically disadvantaged youth serving in the Federal Job Corps.³⁶ By serving at-risk or disadvantaged youth and their families, these programs magnify the personal benefits conferred by wilderness into aggregated social benefits by improving family relationships, increasing ability to change behavior, and improving psychological well-being. The adolescents’ families, schools, and communities at large thus all benefit from the existence of wilderness.

Youth are not the only special population that benefits from dedicated programming; wilderness experiences designed for military veterans also show significant benefits. Though Outward Bound has used wilderness to address trauma in military veterans since 1975,³⁷ demand for these types of services has increased with US military personnel returning from Operation Enduring Freedom and Operation Iraqi Freedom. The National Institutes of Health

³³ Cooley, R. *Wilderness Therapy Can Help Troubled Adolescents*. 4 *International Journal of Wilderness* 3 (1998).

³⁴ Russell, K., Hendee, J., & Phillips-Miller, D. *How wilderness therapy works: An examination of the wilderness therapy process to treat adolescents with behavioral problems and addictions*. In S. F. McCool, D. N. Cole, W. T. Borrie, & J. O’Loughlin (Eds.), *Wilderness science in a time of change conference—Volume 3: Wilderness as a place for scientific inquiry* 216, U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station RMRS-P-15-VOL-3 (2000).

³⁵ *Id.*

³⁶ Russell, K., Hendee, J., & Cooke, S. *Social and Economic Benefits of a U.S. Wilderness Experience Program for Youth-at-Risk in the Federal Job Corps*. 4 *International Journal of Wilderness* 3 (1998).

³⁷ Harper, N. J., Norris, J., & D’astous, M. *Veterans and the Outward Bound Experience: An Evaluation of Impact and Meaning*. 6 *Ecopsychology* 3, 165–173 (2014).

estimates that 7.7 million Americans now live with post-traumatic stress disorder (PTSD), including those returning from combat.³⁸ As a study of Canadian Forces (CF) personnel summarizes, “The underlying story is that transitions from combat to civilian or combat to noncombat CF roles are challenging, in part due to stress injuries, and may lead to depression, isolation, substance abuse, underemployment, and self-destructive behaviors.”³⁹ Unlike wilderness therapy programs, however, veterans programs often use a recreational wilderness program model without formal mental health treatment to avoid the stigma and shame some service members feel when seeking mental health.

Despite the lack of formal therapeutic practices, veterans programs continue to deliver significant positive outcomes. Participants experienced Outward Bound Canada courses “as decompression from stressful operational environments, as a catalyst to seek further treatment for stress-related injuries, as an adjunct to such treatment, and as a way to connect to their CF ‘family.’”⁴⁰ A study of U.S. military personnel who participated in a fly-fishing retreat in a pristine environment demonstrates acute increases in attentiveness and serenity, which can distract veterans from thoughts of combat-related trauma and other symptoms of PTSD.⁴¹ Researchers also posited that the calming setting of the retreat grounded participants and helped them reconnect with themselves outside of the combat context. Surveys of the participants show a number of psychological improvements:

In addition to reductions in symptoms of depression and anxiety, this study found a wealth of acute improvements in mood profiles among participants, including significant increases in state measures of attentiveness, serenity, self-assuredness, joviality, and PA [positive aspect]. Results also revealed significant decreases in feelings of guilt, hostility, fear, sadness, and NA [negative aspect], reductions that sustained to the follow-up assessment. On the whole, the findings pertaining to improvements in mood profiles are consistent with other reports linking leisure activities to increases in PA, decreases in PA, or both.⁴²

These positive benefits to veterans appear consistent across programs. Researchers surveyed participants in 12 veterans programs lasting 4-7 days and offered by four different organizations. The researchers note:

Study participants reported significant improvements in psychological well-being, social functioning, and life outlook one week after the outdoor experience; there was also some indication that these improvements persisted over the next month. As well participants reported that they were much more

³⁸ Vella, E. J., Milligan, B., & Bennett, J. L. *Participation in outdoor recreation program predicts improved psychosocial well-being among veterans with post-traumatic stress disorder: a pilot study*. 178 *Military Medicine* 3, 254–60 (2013).

³⁹ *Supra* n. 37 at 166.

⁴⁰ *Id.* at 171.

⁴¹ *Supra* n. 38.

⁴² *Id.* at 259.

likely to take part in activities that involved exploration (i.e., learning new things, testing abilities) and listening to and helping others after the outdoor recreation experience. The changes in psychological well-being, social functioning, life outlook, and activity engagement were particularly strong for veterans who had initially reported more severe ongoing health issues.⁴³

Though these programs are still gaining traction in the psychological research community, it is clear that wilderness offers veterans immense opportunities for healing and regaining control over their lives. Like the personal benefits to youth who participate in wilderness therapy, personal benefits felt by veterans can accrue to society at large by reducing the demand for mental health services, improving family relationships, and reducing the strain on communities unable to adequately support returning military personnel.

As the diverse personal, social, and intrinsic benefits that accrue from wilderness become better documented, it is increasingly clear that U.S. wilderness preservation policy was farsighted at its inception and continues to be necessary. While it may be argued that some of the benefits attributed to wilderness travel can be developed in other settings, the wilderness setting is often perceived as critical to the people who actually experience those benefits. A common theme among women traveling through the Boundary Waters Canoe Area Wilderness or Grand Canyon National Park was “the importance of being in a *bona fide* wilderness area; in other words, that the trip itself had taken place in a pristine setting, away from the trappings of modern civilization.”⁴⁴ Other researchers report that participants consistently credited the contrast between wilderness settings and the human-made world—especially tranquility, silence, lack of human activity, and the opportunity for solitude—as a trigger for having a peak experience.⁴⁵ It should be noted that in a wilderness context, solitude does not mean simply a low density of people. Rather, solitude is experienced as “psychological detachment from society for the purpose of cultivating the inner world of self. It is the act of emotionally isolating oneself for self-discovery, self-realization, meaning, wholeness, and heightened awareness of one’s deepest feelings, and impulses.”⁴⁶ Concepts of wilderness and solitude are thus deeply connected. Wilderness areas provide prime opportunities for solitude, tranquility, self-challenge, and other factors that promote peak experiences, personal and spiritual development, and psychological healing.

The studies cited above support a common understanding in modern society of the value of wilderness to all of us. This understanding is not new to the Forest Service. The

⁴³ Duvall, J., & Kaplan, R. *Exploring the Benefits of Outdoor Experiences on Veterans*. The Sierra Club, Military Families and Veterans Initiative (2013); Duvall, J., & Kaplan, R. *Enhancing the well-being of veterans using extended group-based nature recreation experiences*. 51 *Journal of Rehabilitation Research and Development* 5, 685–696 (2014).

⁴⁴ *Supra* n. 31 at 30.

⁴⁵ *Supra* n. 22.

⁴⁶ Hollenhorst, S. J., & Jones, C. D. *Wilderness Solitude : Beyond the Social-Spatial Perspective*. In W. A. Freimund & D. N. Cole (Eds.), *Visitor Use Density and Wilderness Experience* 56, RMRS-P-20, U.S. Dept. of Agriculture, Forest Service, Rocky Mountain Research Station (2001).

following is an excerpt from Wilderness.net, a collaborative project between the University of Montana College of Forestry and Conservation and the four primary federal land management agencies:

Across cultures and history, people have also attached symbolic values to wilderness. This symbolism can take a spiritual tack, as in the writings of John Muir, who viewed wilderness as everywhere imbued with divine beauty. Some may see wild places as emblematic of other values they cherish, such as freedom and opportunity, or of Nature in general. The idea that wilderness represents something nourishing and fortifying for the human spirit—even for those who never tread in one, and beyond any practical and scientific benefits—has been cited by many of its most famous proponents. "In wildness is the preservation of the world," Henry David Thoreau famously wrote in his essay, "Walking." In *A Sand County Almanac*, conservationist/ecologist Aldo Leopold asked, "Of what avail are forty freedoms without a blank spot on the map?"

All people, of course, don't share the same perceived benefits when it comes to wilderness, and an individual's values can shift over time. One's impression of wilderness worth seems to stem in part from direct experience with wilderness as well as the influence of other people. For many individuals, "wilderness" means a very specific place, one with which they've developed a highly personal and meaningful relationship over decades. Research suggests such familiarity alone—built from a fundamental association of a particular riverbank, mountaintop, or grove with memories and traditions—can rank near or at the top of a person's wilderness values.⁴⁷

All of these factors are clearly present in the strength of feeling about the BWCAW. But it is not only the wilderness designation that makes the canoe country so highly valued. Many people who visit the Superior National Forest and never enter the BWCAW still find that the scenery (basalt rock outcroppings, boreal forest, and everywhere and in every form, water), the forest sounds (loons, white-throated sparrows, coyotes and wolves), the unobscured night sky speaks to something in them that they understand is crucial, and all too absent from their lives. Places like Birch Lake and the South Kawishiwi River offer this soul-nourishing environment to people who, for whatever reason, are unable to portage canoes and gear into the wilderness.

Steve Koschak describes what this means to visitors to River Point Resort & Outfitting Company, at the point where the South Kawishiwi River and Birch Lake meet:

People come to River Point Resort and Outfitting Company because of the incredible natural beauty and the wilderness setting. People come for the peace and tranquility of a place where they are completely buffered from the noise, sights, and stress of urban life. The resort is all about nature, and that is what people come here for. We provide them with the comforts of home (but without TVs!), in a place where they can escape

⁴⁷ Wilderness.net, *How Wilderness Benefits You*, <http://www.wilderness.net/NWPS/values> (accessed June 9, 2015).

the chaos and craziness of their daily lives. People come here simply to sit on their screened porch, look at the river and forest, and listen to the sounds of nature.⁴⁸

Much of this paper focuses on the BWCAW and the impacts that a mine in the South Kawishiwi area would have on the character of the wilderness. But we should not lose sight of what would be lost outside the wilderness boundaries as well, where the character of the landscape would change from still, deep forest and scenic beauty to industrial activity at its largest and most intrusive. Any government decision that allows mining to move forward in this area is in part a decision to sacrifice a landscape that nourishes people's souls to the most destructive industry that humans have devised.

II. Legal and Historical Support for Protecting Landscapes

Both industry spokesmen and government officials sometimes assume that we must find a way to access minerals wherever they are found. After all, no human considerations can impact where minerals are located in the ground. Under this mindset, once minerals are discovered, destruction of the landscape becomes inevitable. But both Congress and federal agencies have recognized that some places are simply too important to the human spirit to allow them to be lost to industry.

A. The Wilderness Act and the BWCA Wilderness Act

Congress recognized the importance of wilderness to human welfare when it passed the Wilderness Act of 1964. The Act famously states,

It is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by the Congress as "wilderness areas," and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.⁴⁹

The Act goes on to specifically direct federal land managers to preserve the wilderness character of any designated wilderness within their administration.⁵⁰ This directive is not limited to restrictions on activities within the designated wilderness itself; in the absence of specific Congressional directives to the contrary, it applies to any activities that impact wilderness character, wherever they may occur.

⁴⁸ Appendix A, Declaration of Steve Koschak (Sept. 14, 2015).

⁴⁹ 16 U.S.C. § 1131(2)(a).

⁵⁰ *Id.*, subsection (4)(b).

Nowhere is this more clear than for the BWCAW. The United States District Court for the District of Minnesota has interpreted this provision over the course of several decisions, consistently holding that “the text of § 4(b) indicates that the agency’s duty to preserve the wilderness is wholly independent of the source or location of [the] activity,” and “an agency’s duty to preserve the wilderness character under § 4(b) of the Wilderness Act may apply to agency activity that occurs outside of the boundaries of the wilderness area.”⁵¹

Industrial-scale mining is probably the single activity that has the greatest potential for impacting wilderness character when it is undertaken outside of but in close proximity to a wilderness area. There simply is no other activity that creates the same amount of disturbance, noise, light pollution, traffic, human presence, and pollution in remote locations. As it became increasingly clear over time that mining close to wilderness areas would inevitably impact wilderness character, Congress began adding specific provisions to allow that impact in locations where it deemed mineral development to be of equivalent importance. An example is the White Canyon Wilderness Area in Arizona, where the wilderness area boundaries were explicitly drawn to exclude a potential mine. In that situation, the Senate Committee on Energy and Natural Resources stated,

The Committee recognizes that noise, dust, and other non-wilderness activities may impact the proposed wilderness area if significant mining operations on adjacent lands proceed. This subsection clarifies that such mining activities are not to be limited solely because they can be seen or heard within the White Canyon wilderness.⁵²

The subsection referred to is boilerplate language that has been included in several acts establishing wilderness areas in various states. For example, the Arizona Desert Wilderness Act of 1990, which established the White Canyon Wilderness Area, reads:

The Congress does not intend for the designation of wilderness areas in the State of Arizona pursuant to this title to lead to the creation of protective perimeters or buffer zones around any such wilderness area. The fact that nonwilderness activities or uses can be seen or heard from areas within a wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area.⁵³

Such language is conspicuously absent from the legislation that established the BWCAW, a fact that the U.S. District Court for the District of Minnesota found dispositive in holding that the Wilderness Act directive to preserve wilderness character applies to activities that occur outside the BWCAW.⁵⁴

⁵¹ *Izaak Walton League v. Kimbell*, 516 F. Supp. 2d 982, 988-989 (D. Minn. 2007); see also, *Sierra Club v. Kimbell*, 2008 U.S. Dist. LEXIS 107239 at 6-7 (D. Minn.); *Izaak Walton League v. Tidwell*, 2015 U.S. Dist. LEXIS 17698 at 9 (D. Minn.).

⁵² S. Rep. No. 101-359, at 15 (1990).

⁵³ Pub. L. No. 101-628, 104 Stat. 4469 (1990).

⁵⁴ *Izaak Walton League v. Kimbell*, 516 F. Supp. 2d at 988-989.

Furthermore, the BWCA Wilderness Act provides additional support for protecting the wilderness from mining activities. First, the Act establishes both the wilderness area itself, and a “Boundary Waters Canoe Area Mining Protection Area,” a zone outside of the designated wilderness where new mining and mineral exploration is not permitted if it would affect navigable waters.⁵⁵ An express purpose of the Act is to “minimize *to the maximum extent possible*, the environmental impacts associated with mineral development” affecting the Boundary Waters Canoe Area Wilderness and the Boundary Waters Canoe Area Mining Protection Area.⁵⁶ And while the Wilderness Act allows for continued mineral exploration in most wilderness areas,⁵⁷ the BWCA Wilderness Act removes this allowance in regard to the BWCAW.⁵⁸ The BWCA Wilderness Act could hardly exhibit a clearer congressional intent to protect the wilderness area and its access corridors from the impacts of mining.

The BWCA Wilderness Act also supports protecting the South Kawishiwi River and Birch Lake area outside the BWCAW. Section 18(a) of the Act reads,

The Secretary is authorized and directed to expedite and intensify the program of dispersed outdoor recreation development on the Superior National Forest outside the Boundary Waters Canoe Area Wilderness, as designated by this Act. The Secretary shall consider in such new program development the need for the following: additional snowmobile trails, particularly those now planned or under construction; remote campsites on lightly developed lakes; and lake access sites and parking facilities to provide motorized recreation experiences similar to those previously available in the Boundary Waters Canoe Area.

Nowhere is there a better example of such recreational opportunities outside the wilderness boundaries as the South Kawishiwi/Birch Lake area, which has very little residential development and many miles of waterways that are accessible by boats with motors.

It is true that in opinions addressing disputes over logging, ATV and snowmobile use at the edge of the BWCAW, courts have held that impacts on the wilderness must rise to a certain level of significance before activities outside the wilderness would be enjoined. But this is in part due to the Wilderness Act provision that “Nothing in this Act shall be deemed to be in interference with the purpose for which national forests are established as set forth in the Act of June 4, 1897 (30 Stat. 11), and the Multiple-Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215).”⁵⁹ The purposes of establishing national forests according to the Act of June 4, 1897 (the Forest Service Organic Act) are “to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply

⁵⁵ Pub. L. No. 95-495 §§ 9 and 11(a)(2).

⁵⁶ *Id.* section 2(4) (emphasis added).

⁵⁷ 16 U.S.C. § 1131(4)(d)(2).

⁵⁸ Pub. L. No. 95-495 § 11(b)(2).

⁵⁹ 16 U.S.C. § 1131(4)(a)(1).

of timber.”⁶⁰ The Multiple-Use Sustained Yield (MUSY) Act lists the purposes for establishing national forests as “outdoor recreation, range, timber, watershed, and wildlife and fish purposes.”⁶¹ These purposes simply do not include mining. In addition, the BWCA Wilderness Act includes special provisions for logging and motorized recreation outside of the Wilderness Area.⁶² Similar provisions for mining are again noticeably absent.

The statutory directives to protect wilderness character and to protect the BWCAW from mineral development to the maximum extent possible have no countervailing directives that would provide a rationale for permitting a mine if the BWCAW will be affected. Although the Forest Service and BLM are *authorized* to allow mineral development on the national forests,⁶³ they have not been directed by Congress to make such development equivalent in importance to the protection of the wilderness character of the BWCAW and the outdoor recreational opportunities in the rest of the Superior National Forest.

B. Past agency decisions to protect iconic landscapes

The BWCAW is not the first iconic American landscape to be threatened by industrial mining. In the last two decades, mining interests have sought to mine in several locations that would impact such landscapes, including Yellowstone National Park, the Grand Canyon, and the Rocky Mountain Front. In all of these places, decisions were made to protect the character of the landscape, even though it meant that the metal or oil found there would not be made available for human use.

In 1997, the Forest Supervisor of the Lewis and Clark National Forest made the decision not to issue new oil and gas leases in the portion of the Rocky Mountain Front within that forest. The decision followed an extensive NEPA review that found primarily insignificant risks to the natural resources of the area stemming from oil and gas development. However, the Supervisor found that the importance of the landscape to human beings was such that the intrusion of oil and gas drilling was inappropriate there. The Record of Decision reads:

The vast majority of those responding to the Draft EIS were strongly against any development for the purposes of oil and gas exploration in the Lewis and Clark National Forest, particularly on the Rocky Mountain Front (the Front) Concerns expressed include potential impacts to wildlife and other surface resources. A majority of the concerns, however, were expressed regarding the “value of place,” speaking in particular to social and personal values attributed to the Front. It is clear that this is a

⁶⁰ 16 U.S.C. § 475.

⁶¹ 16 U.S.C. § 528. In contrast, the BLM’s directive to manage federal lands outside of the national forests for multiple uses includes minerals in an otherwise virtually identical list. 43 U.S.C. § 17029(c).

⁶² Public Law 95-495 §§ and 6(c)(1) 18(a).

⁶³ *E.g.*, 16 U.S.C. § 520 (authorizing the Secretary of Agriculture to lease minerals on Forest Service land under conditions that he deems to be for the best interests of the United States); 5 U.S.C. Appendix – Reorganization Plan No. 3 of 1946 (transferring authority over mineral leasing on national forests to the BLM, “subject to limitations necessary to protect the surface uses for which these lands were primarily acquired.”)

very unique and special place to many people; both those who live here in Montana as well as those who have visited or only heard about the area. Many of those who commented during the process admitted they have not read the environmental analysis and many may not fully understand – or care to understand – the analysis. They simply want to express heartfelt emotions about a place they consider special. Many feel that development of any kind, particularly oil and gas development, would “ruin” the special feeling of the Front, regardless of whether they ever saw or experienced the results of development. Their perceptions about the value and spirituality of a place would be affected. Many feel that relatively undeveloped lands such as those on the Front are a diminishing resource, and increasingly hard to find. They point to its uniqueness in that sense. They also feel the need for oil and gas does not outweigh the intrinsic values of the lands in and along the Rocky Mountain Front. . . .

This [NEPA] analysis, as well as other previous analyses addressing oil and gas issues on the Rocky Mountain Division, show that limited and closely controlled oil and gas exploration and development can take place in this area without significant negative impacts to wildlife or other surface resource values. I also understand that oil and gas technologies have made significant advances in reducing impacts to sensitive areas such as the Rocky Mountain Division, and I expect that these technologies will continue to improve in the future. But, the effects of such activities on social values and human needs and desires are much more difficult to quantify or describe. These difficult concepts have been at the crux of the issue regarding management and uses (particularly oil and gas leasing and development) along the Rocky Mountain Front for many years. The Forest has tried to recognize these social and emotional values and they have figured prominently in my decision not to lease the Rocky Mountain Division. I have considered social values as well as scientific values and recognize the importance of both.⁶⁴

Three years later, U.S. Forest Service Chief Michael Dombeck recommended that the Department of Interior withdraw 405,000 acres of the Helena and Lewis and Clark National Forests from mining exploration and development to protect the same landscape. The Record of Decision reads in part,

Based on the analysis in the Rocky Mountain Front Mineral Withdrawal FEIS, I have decided that a mineral withdrawal is warranted to protect the outstanding natural resources present in this area.

. . .

The area is noted for its spectacular beauty and outstanding dispersed recreation opportunities. The undeveloped recreation opportunities and the area’s proximity to

⁶⁴ Gloria E. Flora, *Lewis and Clark National Forest Oil and Gas Leasing, Final Environmental Impact Statement, Record of Decision* (August 28, 1997).

the Bob Marshall Wilderness Complex and Glacier National Park draw visitors from across the state and the nation. The area's remoteness, wildness, scenic beauty and spiritual values have resulted in a very significant core of recreationists and other users with strong, emotional attachments to the area and its existing character. Exploration associated activities such as drilling, trenching or road building could displace recreationists or decrease the sense of remoteness in an area. The withdrawal would help maintain the existing recreation setting and opportunities.⁶⁵

It is completely appropriate for federal land management agencies to request that the Secretary of the Interior withdraw federal minerals from leasing in a particular forest or region in order to protect America's special landscapes. The authority to do so is found in the Federal Land Management and Planning Act (FLPMA).⁶⁶

In 2012, the U.S. Forest Service and Bureau of Land Management jointly asked the Secretary of the Interior to withdraw 1,006,545 acres from mineral leasing in an area adjacent to the Grand Canyon National Park, in order to protect water resources and the character of the Grand Canyon from the impacts of uranium mining. The Record of Decision (ROD) noted that the impacts of mining were uncertain. The BLM nonetheless felt that withdrawal of minerals was appropriate, because although the likelihood of a serious impact was low, if such a mishap were to occur, it would be significant. As the ROD states, "The withdrawal area is located in the Grand Canyon watershed and its environs and adjacent to the Grand Canyon National Park. As this area contains unique landscapes, is a sacred place for numerous tribes, and receives visitors from all over the world, it is appropriate to tread carefully." In concurring with the decision, the Forest Service stated, "A withdrawal is appropriate to help protect the natural, cultural, and social resources in the Grand Canyon watershed from the adverse effects of the locatable mineral exploration and development."⁶⁷

The EIS for the withdrawal elaborated on some of the effects of mining in areas near the Grand Canyon:

Indirect impacts to the untrammeled character of designated or proposed wilderness could occur if management activities manipulate the components or processes of ecological systems inside the wilderness. This could occur through indirect impacts to vegetation, wildlife, and water resources within the wilderness.

The soundscape analysis . . . indicates that operation associated with mining activity would cause increases in ambient noise levels in the immediate vicinity of the mine sites and haul roads; this has the potential to impact natural and undeveloped characteristics of the wilderness area In addition, mining activities within the viewshed of a

⁶⁵ Michael Dombeck, *Record of Decision, Rocky Mountain Front Mineral Withdrawal, Helena and Lewis and Clark Forest Plan Amendments* (Sept. 25, 2000).

⁶⁶ 43 U.S.C. § 1714.

⁶⁷ Ken Salazar, Department of the Interior, *Record of Decision, Northern Arizona Withdrawal, Mohave and Coconino Counties* (Jan. 9, 2012).

designated or proposed wilderness area would have an impact on the natural and undeveloped characteristics of the wilderness area. The presence of mineral exploration and development components adjacent or within close proximity to designated or proposed wilderness that could impact the undeveloped and natural characteristics include exploration drilling rigs, mine facilities (building structures, towers, and equipment), roads, power lines, ore-haul traffic, and dust. These components would be inconsistent with the requirement to retain the primeval character of the wilderness.

The recreation analysis . . . indicates that operation associated with mining activity . . . would potentially alter the existing recreation setting and opportunity as a result of the presence of new roads in previously non-roaded areas (note that no new roads will be located within the designated or proposed wilderness areas), heavy-haul trucks, and mining facilities. This has the potential to impact solitude or primitive and unconfined recreation within a designated or proposed wilderness located adjacent to or within close proximity of mining activity.

Although designated wilderness areas such as Mount Trumbull and Mount Logan Wilderness areas are not within or immediately adjacent to the proposed withdrawal, indirect impacts . . . could occur, such as noise. Noise associated with mining activity would detract from the wilderness definition of land as possessing a 'natural' and 'undeveloped' characteristic. Thus, Alternative A would have minor, long-term indirect impacts to nearby wilderness areas such as Mount Trumbull or Mount Logan Wilderness areas.

Noise levels from exploration, mine development, and reclamation/closure activities would be limited to short durations over a period of a couple months at any one location. However, portions of the proposed withdrawal border Grand Canyon National Park; therefore, it is possible that sounds from the mine exploration, development, and reclamation/closure activities could be audible within the Park, impacting recreation settings and experiences. Similarly, it is possible that recreationists on or near the uranium ore haul route north of the proposed withdrawal area (for example, visitors along U.S. 89 within the Grand Staircase–Escalante National Monument) would experience some diminution in quality of the recreational setting due to the presence of haul traffic.⁶⁸

In 1997, the Department of the Interior withdrew 22,000 acres in the Cooke City, Montana area from federal mineral leasing to protect Yellowstone Park. According to the EIS prepared for the withdrawal,

The primary purpose for the proposed Cooke City Area Mineral Withdrawal (CCAMW) is to protect water quality and fresh water fishery resources within the watersheds of

⁶⁸ Bureau of Land Management, *Northern Arizona Proposed Withdrawal Final Environmental Impact Statement* (October 2011).

Soda Butte Creek, Clarks Fork River, and Stillwater River from the effects of future hard-rock mining activities that could occur on federal lands in the headwaters of these streams. Based on public comments received during scoping, other identified reasons for the withdrawal include protection of surrounding wilderness areas, scenic integrity, recreation opportunities, cultural resources, and wildlife habitat.⁶⁹

Although the EIS acknowledged that the impacts of mining were uncertain, the BLM and Forest Service found that the *risk* of impacts to the Yellowstone watershed was sufficient reason to forego mining:

Certain mining-related activities pose risks to these watersheds (Appendix H, Failure Modes Effects Analysis). These risks include the potential for increased acid-rock drainage, the potential for ground-water contamination from underground mines, potential for failure of tailings impoundments and uncertainty of mitigating effects to wetlands. Withdrawal of these lands would help ensure that the physical and biological integrity of these important downstream watersheds is maintained.

The EIS also acknowledged that the potential impacts of mining on recreation and the character of Yellowstone Park and the nearby Absaroka-Beartooth Wilderness were important to the decision:

The potential effects of future mining on recreation opportunities and scenic integrity is a concern. The mineral withdrawal may help maintain the existing character, settings, recreation experiences, and opportunities.

Yellowstone NP borders the study area for three miles. US Highway 212 through Cooke City and Silver Gate is the northeast entrance to the Park. A mineral withdrawal could reduce the potential for mining-related effects to the Park's water quality, air quality, wildlife, and recreation experiences. Future mineral development could affect Park operations due to increased local populations and increased winter access.

Future mining could diminish existing opportunities for solitude in nearby wilderness by introducing noise and artificial lighting. Mining claims could be located in roadless areas increasing the potential for future mineral development that could alter the character of the roadless areas.

Noise, night lighting, and increased population associated with mining development could change the solitude, natural integrity, and primitive recreation experience available in wilderness areas surrounding the study area. Changes in nearby human activity, noise, dust, wilderness water quality, and night lighting caused by mining would

⁶⁹ U. S. Dept. of the Interior and U.S. Dept. of Agriculture, *Environmental Impact Statement for the Proposed Cooke City Area Mineral Withdrawal: Final* (July 1997).

also likely change the primitive recreation experience. Users seeking solitude and natural environments may be displaced.

The EIS also acknowledged that these changes could affect the quality of life of local residents, many of whom live in the area precisely because of the beauty and quality of the local environment:

Changes to the social structure and diversity in the study area could occur due to mining-related development. Concerns about future mining include increase in population, loss of recreation opportunities, increased traffic, shortage of housing, and changes to the overall quality of life. Other local residents support mining for the economic stimulus and improvements to local infrastructure and services that could occur. Those residents of Cooke City/Silver Gate, MT that were surveyed, rated a clean environment, recreation and tourism, low crime rate, and a low growth economy as the four most important economic and social factors. Many people choose to live in this area because of the quality of the natural environment, recreation opportunities, serenity and privacy. The proposed mineral withdrawal may help reduce the potential for mining-related changes to the area.

The above decisions all recognize the importance of a “sense of place” in landscapes of particular beauty and spiritual resonance. Whether expressed in terms of impacts on the character of wilderness, the quality of life of local residents, or the quality of visitor experiences, the overall import is that America’s iconic landscapes are too important to the American people to allow them to be bulldozed and otherwise degraded by industrial-scale mining.

III. Incorporating the human value of landscapes into environmental assessments

Despite the reality that the strongest reason to disallow mining in certain landscapes may be the value that humans attach to those landscapes and their impact on people’s quality of life, government decision makers often appear to assume that any decision *not* to allow mining must rest on quantifiable impacts to specific natural resources (e.g., water quality or endangered species). The NEPA process places an emphasis on assessing risks to such resources, and that emphasis is appropriate because those risks might otherwise not be apparent. Agencies look to the field of environmental risk assessment to guide their decisions about land use changes, which is also appropriate. However, this can blind decision makers to the importance of factors that are difficult to cover in such an assessment.

This situation is changing, however, primarily due to the prompting of indigenous communities, who often find that the environmental review parameters that are important to agency decisions do not encompass many of the real impacts on their lives. The following discussion looks at the environmental risk assessment process and some of the suggestions that

have arisen to address the disconnect between environmental review and many of the values that are most important to the people affected.

Whether undertaken pursuant to NEPA or for some other purpose, an initial critical aspect of any environmental risk assessment is the identification of assessment endpoints. The risk assessment then focuses on identifying the range of potential impacts on those specific endpoints. The U.S. Environmental Protection Agency has described this process as follows,

Selection of assessment endpoints is a key component of the problem formulation stage of an ecological risk assessment. Each endpoint is an explicit expression of the environmental values of concern in the assessment, in terms of both the entity valued (e.g., a species, community, or ecological process) and a potentially at-risk characteristic or attribute of that entity Endpoints can be defined at any level of ecological organization, from within an organism to across ecosystems, depending on the needs of the assessment. In all cases, however, selected endpoints should be relevant to both ecology and decision-maker needs, as well as susceptible to potential stressors.⁷⁰

Risk assessments are used in a wide range of settings, with endpoints and protocol varying with the different disciplines. The EPA has published separate guidance on ecological risk assessment and on several different aspects of human health risk assessment, ranging from carcinogens to reproductive health.⁷¹ As an example, common endpoints in ecological risk assessments include such things as specific ecosystems or ecological communities (with impacts measured in terms of number of acres lost or degraded), water quality (with impacts measured in terms of changes in various parameters), and population of specific species (with impacts measured in terms of numbers of animals).⁷²

In the last two decades, it has become increasingly clear that this dual focus on human health and ecology leaves out a set of what are often the most important endpoints in regards to the decisions that risk assessments are designed to inform. These are sometimes identified as cultural endpoints, which run the gamut from those that defy quantification, such as the “sense of place” within which human life, community, and activity occurs, to those that sometimes appear easy to quantify, such as economic parameters.

Another term used to denote these values is “human welfare.” As one observer put it,

Human welfare requires a functioning environment that satisfies material, aesthetic, and emotional needs. Human health depends on human welfare in obvious ways, which means it also depends indirectly on the environment. More subtly, health appears to

⁷⁰ U.S. EPA, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska* (EPA 910-R-14-001) 5-1 (2014), citing U.S. EPA, *Guidelines for Ecological Risk Assessment* (EPA/630/R-95/002F) (1998).

⁷¹ U.S. EPA, *Risk Assessment Guidance & Tools Website*, http://www.epa.gov/risk_assessment/guidance.htm, (accessed May 5, 2015).

⁷² U.S. EPA, *Generic Ecological Assessment Endpoints (GEAEs) for Ecological Risk Assessment* (EPA/630/P-02/004F) (2003).

benefit directly from an experience of ecological integrity. Conversely, environmental protection seems to be best achieved where people have sufficient welfare to not despoil the environment for short-term subsistence.

Clearly, the assessment of human welfare is missing from current practice. Human health risk assessors address only the relatively simple problem of direct effects of contaminants on health. Ecological risk assessors address the more complex, but still concrete, problem of effects of contaminants on nonhuman organisms, populations and ecosystems. Normally, risks to human welfare from contaminants are not assessed. An obvious impediment is the fact that welfare is not as easily defined or recognized as human health, ecosystem production, or fish abundance. Human welfare is a state that results when people inhabit an environment with a particular mixture of natural, built, and cultural features. It results from the provision of nutrition, shelter, clothing, knowledge, sociality, recreation, and many other things requiring material products of nature, functions of nature, or the experience of nature in some combination with human culture.⁷³

Indigenous people have been at the forefront in suggesting that typical methods of conducting human health and ecological risk assessment are not adequate to assess the impacts of a natural resource decision on the well-being of local communities. In a seminal article from the Confederated Tribes of the Umatilla Indian Reservation, a community dealing with the cleanup up the Hanford Nuclear Site, the authors wrote:

There is a growing recognition that conventional risk assessment methods do not address all of the things that are 'at risk' in communities facing the prospect of contaminated waste sites, permitted chemical or radioactive releases, or other environmental harmful situations. Conventional risk assessments do not provide enough information to 'tell the story' or answer the questions that people ask about risks to their community, health, resource base, and way of life . . . As a result, cumulative risks, as defined by the community, are not described, and risk-based decisions may not be accepted. The full span of risks and impacts needs to be evaluated within the risk assessment framework in order for cumulative risks to be adequately characterized. This is in contrast to a more typical process of evaluating risks to human health and ecological resources within the risk assessment phase and deferring the evaluation of risks to socio-cultural and socioeconomic resources until the risk management phase.⁷⁴

⁷³ Glenn W. Suter, *Bottom-Up and Top-Down Integration of Human and Ecological Risk Assessment*, 67 *Journal of Toxicology and Environmental Health, Part A: Current Issues* 779-790 (2004).

⁷⁴ Stuart G. Harris and Barbara L. Harper, *Using Eco-Cultural Dependency Webs in Risk Assessment and Characterization of Risks to Tribal Health and Cultures*, 2 *Environ. Sci. & Pollut. Res. Special Issue* 91-100 (2000) (citations omitted). See also, Elizabeth Hoover, *Cultural and health implications of fish consumption advisories in a Native American community*, 2 *Ecological Processes* (2013); Jacklyn R. Johnson & Darren J. Ranco (2011), *Risk Assessment and Native Americans at the Cultural Crossroads: Making Better Science or Redefining Health?*, in Cohen, Benjamin R. and Ottinger, G., eds., *Technoscience and Environmental Justice: Expert Cultures in a Grassroots Movement* (2011).

The EPA and other decision-makers have begun identifying human welfare endpoints in specific situations, particularly those assessing ecological risks in landscapes that hold unique value for a human community. For example, the endpoints for the EPA's risk assessment for the proposed Pebble Mine in Bristol Bay, Alaska included: "(1) the abundance, productivity, or diversity of the region's Pacific salmon and other fish populations; (2) the abundance, productivity, or diversity of the region's wildlife populations; and (3) the health and welfare of Alaska Native cultures."⁷⁵ The Pebble Mine study limited its consideration of impacts to native cultures to those arising from the loss of salmon, but it is easy to imagine that other impacts of mining could add to the impact on native welfare; in this sense the assessment of impacts on human welfare was incomplete. As is often the case, the report did provide information quantifying the value of salmon to the economy. It should be noted, however, that while monetary figures can reflect the importance of a resource (or "endpoint") to the human community, they do not capture the total value of the resource. For example, the economic value of salmon does not capture the meaning of salmon to native cultures in terms of identity, history, spirituality, and community cohesiveness.⁷⁶

Risk managers who are developing this broader understanding of risk assessments often point out that the need for a new approach is not limited to native communities.⁷⁷ Sometimes in the relative uniformity of life across a country as large as the United States, we fail to see that our welfare is also dependent on maintaining the crucial roles and meanings that nature and natural places provide. We would do well to identify the aspects of ecosystems and natural landscapes that contribute to human well-being whenever they are threatened in a way that calls for a risk assessment, whether that be through NEPA or other avenues of land management decisions.

In considering any type of environmental risk assessment for mining activities in the South Kawishiwi area of the Superior National Forest, the wilderness character of the BWCAW is clearly a critical assessment endpoint, as is the meaning of the larger landscape to residents and visitors. The BWCAW – and the larger canoe country that extends beyond its borders – uniquely meets the aesthetic, emotional, and spiritual needs of a large number of people, contributing to their overall health in ways that cannot be quantified, but are no less valid.

IV. The potential impacts of mining on the BWCAW and the South Kawishiwi area

A final question that remains is whether mining in the South Kawishiwi area would necessarily present risks to the character of the area to the extent that it would no longer meet these aesthetic, emotional, and spiritual needs. The only possible answer to that question is that it would. There can be no doubt that mining in this area would eliminate its value for recreation, quiet and serenity, spiritual succor, and simple enjoyment of the natural world. In

⁷⁵ *Supra* n.71 at 5-1.

⁷⁶ *See id.* at 5-36 to 5-39.

⁷⁷ *E.g., supra* n. 74.

the BWCAW, the proximity of industrial activity and its attendant sounds, lights, traffic and dust would mean that this part of the wilderness area would no longer be experienced as wilderness. Outside of the BWCAW, what is now a beloved recreation area would become an industrial landscape.

Mining company descriptions are carefully crafted to create the impression that the change to the character of the area will not be overwhelming. Despite indications that Maturi Southwest will eventually result in an open pit,⁷⁸ all mines are described as “underground.”⁷⁹ The processing facility is to be located “south of the Ely airport,” and the tailings basin facility, outside of the watershed.⁸⁰ The extensive surface facilities that would be needed directly above the underground mine workings are rarely mentioned.⁸¹ But the reality is that if even a single mine is permitted in this area, industrial-scale buildings, roads, and pavement will stretch from the edge of the national forest, across Birch Lake, to within two miles of the wilderness boundary.

The October 2014 Twin Metals’ 43-101 filing with the Canadian Securities Administrators lists the following aboveground infrastructure that would need to be located directly above the mine workings at the Maturi mine site (within two miles of the BWCAW):

Portals	Truck Wash
Air Intake and Exhaust Shafts	Fuel Storage
Paste Plants	Guard House and Gate
Backfill Distribution System	Pipelines
LNG Storage Facility	Roadway and Bridge
Heater Building	Power Lines
Backup Power System	

This is what visitors to the “wilderness” would drive through within a few minutes of beginning their wilderness trip. As former wilderness guide Rachel Garwin notes, “Wilderness, especially the BWCAW, is one of the last places in the U.S. where one can escape from the constant noises of civilization and be reminded that there is a world significantly less governed by human will.”⁸² It is difficult to imagine how visitors would receive such a reminder if their access to the wilderness is through an industrial landscape.

⁷⁸ AMEC, *Twin Metals Minnesota Project NI 43-101 Technical Report on Pre-Feasibility Study* 14-30 (2014) states, “Although the resource classification is based on an underground mining scenario, the deposit will likely be mined to the surface at some point in the future,” and includes mineralization up to 15 ft. below the surface in its estimate of available ore.

⁷⁹ See, e.g., Twin Metals Minnesota, *Project Facts*, <http://www.twin-metals.com/about-the-project/project-facts/> (accessed July 6, 2015).

⁸⁰ *Id.*

⁸¹ *Id.* (“To support the underground mine operation and reduce surface impacts, a variety of fixed facilities will be constructed underground, including primary crushers, conveyors, pumping stations and electrical substations.”)

⁸² Appendix A, Declaration of Rachel Garwin (Sept. 1, 2015).

In regards to the South Kawishiwi/Birch Lake area outside of the wilderness area, it would simply no longer be appropriate for recreational activities. It would be naïve at best to believe that this area would retain any of its current character as a forest and water recreational area if a mine is located there.

Nor would the planned location and access to the concentrator site minimize the disruption. The decision has apparently been made to access the concentrator site and mine portals from County Road 120, rather than from Highway 1 and Little Lake Road.⁸³ But the reality is that Little Lake Road would no longer be available to the public. While plans to access the concentrator site from the West may induce the belief that the mining facilities will not be noticeable from Highway 1 and Birch Lake, in reality the mining facilities will be located in a swath that crosses both the lake and the highway. The real import of an entry road from 120 will be that 120 and Highway 1 will become connected by development and roads, where there is currently no access across this four-mile wide stretch of forest.

People who live or recreate in this area already find that it is losing its wilderness character due to drilling, blasting, and truck traffic noise from mining exploration. Three declarations are attached to this paper as Appendix A describing these impacts, two from wilderness guides and one from the owner of a resort and outfitting company.

Rachel Garwin, a former instructor at the Voyageur Outward Bound School (VOBS) who guided dogsled trips in the winter when mining companies were drilling, has this to say:

Hearing industrial noises—whether they are from drilling, truck engines, or other activities that require booms and explosions—has had an unfortunate impact on my wilderness experience. Wilderness, especially the BWCAW, is one of the last places in the U.S. where one can escape from the constant noises of civilization and be reminded that there is a world significantly less governed by human will. The level of protection from noise—including one of the highest flight ceilings in the country—and other intrusions from industry the BWCAW enjoys promote this significant sense of quiet and solitude. When I hear noises from drilling or other heavy machinery, it brings civilization and industry back to the forefront of my mind. These noises disrupt opportunities for quiet reflection the wilderness is so suited to offer. The intrusive noise reduces the size of the de facto wilderness, even though the legal boundaries do not change.

When I have experienced noise intrusions while within the BWCAW, I have either been in the presence of other VOBS staff who have spent significant amounts of time in the BWCAW and other wild places or students for whom this was their first meaningful interaction with wilderness. In some ways, their reactions were similar. They expressed shock that they were hearing noises from civilization within a federally protected wilderness area. They wished that the noise would cease so that it wouldn't distract

⁸³ *Supra* n. 79 at 18-1.

them from the wilderness experience at hand. Finally, they hoped that the noises wouldn't come back or increase in the future. Most strikingly, even these temporary intrusions negatively impacted the students' experiences, which will be the only BWCAW experience many of them ever have. Since they will likely not return to the BWCAW, that temporary nuisance becomes a permanent impact, as they will carry that negative experience with them for the rest of their lives.

Based on my observations of my students noticing the noise from mineral exploration and other industrial activities, I believe that it annoyed them, disrupted their wilderness experience, and brought them back into more conscious contact with civilization. The noises also provided clues to my students that they actually weren't as far from civilization (and thus home) as they thought, and they had a much harder time letting go of homesickness and fully committing to the wilderness expedition experience. I've heard from others that drilling noises have reached into the Weasel Primitive Management Area, where students on shorter courses (especially adult students) sometimes have their "Solo" experience. Noise would certainly interfere with the purpose of Solo, which is both for quiet reflection and physical rest.

If noise similar to what I have heard on specific trips were likely to occur on any given trip, I expect that the South Kawishiwi River and Little Gabbro/Gabbro/Bald Eagle Lake area would significantly decrease in popularity. People have a lot of different reasons to undertake a wilderness trip, but research suggests that one of the most important is to get away from it all and experience awe-inspiring natural landscapes. Additionally, the BWCAW is well known for its "great silences," a term coined by Ely resident and wilderness advocate, Sigurd Olson. Should these great silences be marred by incessant drilling, occasional booming, truck traffic, or other industrial noises, this area of the BWCAW would be a much poorer place for wilderness travel. Since it is an easily accessible, remote-feeling portion of the BWCAW that has a varied landscape and does not have motor access, it would be a great loss.⁸⁴

Paul Schurke, the owner of and guide for a business that offers dogsled trips into the BWCAW in the winter, states:

During the winter of 2013 in particular, a lot of test drilling was being done in the South Kawishiwi area. The noise at Gabbro Lake was constant, 24-7, and was loud enough to be continually noticeable despite natural sounds. The noise had a grinding quality and was very unpleasant. We travelled and camped in other locations along that corridor as well, and found that the whole area was impacted by drilling noise. It was most noticeable at night. It became a frequent topic of conversation amongst our guests, especially around the campfire at night. It was embarrassing for me and the other

⁸⁴ *Supra* n. 82.

guides. People come from all over the world – very long distances – to experience the BWCA as a place “untrammeled by humans,” and then are subject to constant mechanical noise during key segments of their trip. My experience of the wilderness was negatively affected by the noise, and I believe my guests’ experience was negatively affected as well.

If mining is permitted, I do not believe that people who know beforehand about the impact will choose to travel in this part of the wilderness. Based on my experience thus far, I believe that if mining is permitted, this part of the BWCA will be sacrificed to mining.

This is particularly unfortunate because the Gabbro-Bald Eagle Lakes area is one of the “favorite haunts” of the entire BWCA. The fishing is known to be exceptional, and the routes are beautiful and very accessible, with relatively short and easy portages and lakes that are not so large that they are overwhelming on a windy day. Usership and interest for the entry points in this area are some of the highest-ranking (within the top five) of any area within the BWCA.⁸⁵

Steve and Jane Koschak, whose resort and outfitting business sits directly across the river from the Maturi mine site, give an indication of what it might be like to visit or camp in the area while drilling occurs:

A group of summer home owners adjacent to our property were coerced into a road-use agreement with the understanding that the mining company would cease exploratory drilling in their neighborhood in the summer months. However, the mining company did not negotiate with River Point Resort and Outfitting Company, and we have been subjected to drilling noise throughout the fall, winter and spring every year for many years. The noise occurred so frequently and for so long that we did not keep track of the dates and times. The noise has often been loud and constant enough that we do not open our windows. Whether it is because the birds aren’t there or because we cannot hear them over the drilling noise, we did not hear the sound of birds around our property in the spring for several years, from 2006 through 2013. We did not realize how completely the birdsong had been missing during that time until the spring of 2014, after Twin Metals stopped drilling.

When drilling is being done, the noise is constant – day and night. In addition to drilling noise, we heard screeching and banging when drills were being changed, and heavy truck activity. The activity was sometimes close enough to us that we could hear the voices of the workers. We felt captive in our home, as we did not want to be outside in the noise. The whole point of living where we do is lost when we cannot be outside.

⁸⁵ *Supra* n. 4.

The constant barrage of sound is wearing on us mentally and emotionally; it adds a layer of stress that we would not otherwise experience. This became especially clear to us in 2014 when the noise stopped; the absence of the stress of noise made us realize how much of burden it was. Nonetheless, the stress of living under the threat of losing our business and home to the mining industry is a constant deep dark cloud over us every day.

In the summer of 2013, Twin Metals continued drilling into the summer guest season. This was a significant disruption for our guests, and definitely impacted the quality of their experience here.⁸⁶

Silence – the absence of human noise – is an intrinsic aspect of the experience of wilderness. Again, from Kevin Proescholdt:

Now, at dusk, it is completely still and quiet. Layers of fog hang over the open water of the Royal River. The only sound to reach my ears now as I stand outside my tent straining to hear is the distant murmur of the river as it leaves the lake and begins to tumble to North Fowl Lake. The great wilderness silences envelop me here as I stand alone, absorbed in the scene.

Quiet and silence are some of the prized attributes of a winter trip to the Waters, of trips to any wilderness in any season. They are increasingly rare as modern civilization, with its noise, machines, and impacts on the land, dominates more and more of the natural world. Wilderness areas like the Boundary Waters offer the chance to experience wild country on its own terms, without sounds and sights and smells of civilization intruding.⁸⁷

Mining in the South Kawishiwi area would destroy the “great wilderness silences” in the nearby wilderness for many decades. Given the proximity of the wilderness to the proposed mining area, noise would carry into the wilderness area under any possible mining scenario. To get an idea of the likely level of that noise, the EIS for the Northern Arizona Mineral Withdrawal provides a comparison. The Northern Arizona EIS assessed the potential for noise from mining operations to reach the Grand Canyon National Park. It should be noted that the EIS did not address a specific mining proposal, but rather provided a description of environmental factors that accompany mining and a qualitative assessment of the potential for those factors to impact the Park if a mine were built within a few miles of its boundaries.

As is the case in Minnesota, enough was known about the mineral deposits in Northern Arizona to provide a rough idea of the size and number of likely mines. The EIS used a “reasonably foreseeable development (RFD)” scenario of a maximum of six underground mines

⁸⁶ *Supra* n. 48.

⁸⁷ *Supra* n. 5 at 97-98.

operating in any given year, with a maximum total production of 556,000 tons of ore per year (278,000 tons total for each mine over its lifetime of three years, with six mines operating at a time).⁸⁸ This compares with a yearly production of 18,250,000 tons of ore per year at the Maturi mine. In other words, the Maturi mine would produce 33 times more ore on a daily and annual basis than the RFD scenario used in the Northern Arizona EIS. It could thus be expected to produce a considerably larger amount of noise.

The Arizona EIS estimated that at a distance of 7.5 kilometers (4.6 miles) from the mines, the dBA range would be between 33.3 and 87.3.⁸⁹ Again, this is for mining activity 33 times less than would be expected at the Maturi Mine. Ambient noise levels in the BWCAW average between 24 and 32 dBA in the winter and 25 to 36 dBA in the summer, dropping to between 14 and 25 dBA about ten percent of the time.⁹⁰ The obvious conclusion is that industrial noise would be heard continuously throughout the day and night in the South Kawishiwi/Gabbro/Bald Eagle area of the BWCAW.

The noise level would almost certainly be greater than what is currently heard from mineral exploration. In its Record of Decision governing mineral exploration in the Superior National Forest, the Forest Service limited the volume at the boundary of the BWCAW to 30 dBA 50% of the time (L50 level of 30 dBA) and 35 dBA 10% of the time (L10 level of 35 dBA).⁹¹ Assuming those levels are being met, it is clear that the noise of a mine, even at the lowest possible level, would impact people's wilderness experience. It is also apparent that the noise of a mine would be greater than the level that the Forest Service deems unacceptable.

Another factor that contributes to people's experience of the BWCAW and surrounding forest and waterways is the clarity of the air and the stunning experience of the night sky. Many, many people see northern lights for the first time from the Boundary Waters, and many more are left awe-struck by the stars. Paul Schurke and Rachel Garwin both mention the night sky as a critical part of the wilderness experience. Satellite imagery showing light pollution and the current darkness of most of the Superior National Forest gives a good sense of the feeling of remoteness that pervades the BWCAW.⁹²

Mining would affect both the clarity of the air and the view of the night sky for an unknown distance into the wilderness. This would occur due to air emissions and dust, and to night lighting of the mining facilities, which would operate 24 hours a day. While satellite imagery indicates that cities and towns are the greatest sources of light pollution in Northeastern Minnesota, a close examination indicates that currently operating mines contribute to the problem.

⁸⁸ *Supra* n. 69 at 4-2.

⁸⁹ *Id.* at 4-206, Table 4.10-6.

⁹⁰ U.S. Forest Service, Superior National Forest, *Final Environmental Impact Statement, Federal Hardrock Mineral Prospecting Permits* 91 (May 2012).

⁹¹ Timothy Dabney, U.S. Forest Service, Superior National Forest, *Record of Decision, Federal Hardrock Mineral Prospecting Permits* 10 (May 18, 2012).

⁹² See Appendix B, Google Earth maps.

The National Park Service recognizes protection of the night sky from light pollution as an important component of the protection of wilderness. As the Park Service Night Sky website puts it, “Starry night skies and natural darkness are important components of the special places the National Park Service protects. National parks hold some of the last remaining harbors of darkness and provide an excellent opportunity for the public to experience this endangered resource.”⁹³ This is equally true of wilderness areas within the national forests. Dan Duriscoe of the National Park Service’s Night Sky Program explains:

The idea that wild and beautiful lands with all their appealing attributes should be preserved *for their own sake* has sometimes been described as “the esthetic of the sublime” (Rodman 1983). Since the Romantic movement, persons of European background have equated the feeling of awe such places bring about with sacredness, or a place that is beyond and far greater than humanity. Perhaps no landscape has promoted such feelings more than that which includes the night sky, which has been described as “that most glorious and compelling and inspiring of nature’s faces” (Schaaf 1988, 205).

.....

Part of the intent of the Wilderness Act of 1964 was to provide all Americans access to “primitive and unconfined” recreation and opportunities for the spiritual enlightenment and personal development such experiences provide. The view of a dark night sky can certainly be interpreted as an integral part of that experience, and remote wilderness parks are among the few places left where it can be seen.

.....

If an artificial light is erected and maintained that compromises or interferes with the view of the night sky from a wilderness preserve, that light is in violation of one of the basic premises of the wilderness ethic: namely, obvious evidence of human technology becomes visible on the landscape. Such a situation is known as “light trespass,” and may be regarded as just as serious a violation of the wilderness character as the trespass of domestic livestock or offhighway vehicles onto wilderness lands.⁹⁴

Mine facilities are also some of the nation’s largest sources of air pollution and dust, which obscures the view both day and night. While it is not possible at this point to determine the degree of impact that Twin Metals mining operations would have on visibility in the BWCAW, some degree of impact is certain. The proposed PolyMet Mine (whose processing plant would be located at least four times farther from the BWCAW and would process about

⁹³ National Park Service, Night Sky, <http://www.nature.nps.gov/night/> (accessed July 6, 2015).

⁹⁴ Dan Duriscoe, *Preserving Pristine Night Skies in National Parks and the Wilderness Ethic*, 18 The George Wright FORUM 30-36 (2001).

64% as much ore as the Twin Metals plant) may impact visibility in the BWCAW by up to 11% on the worst days.⁹⁵ Fugitive dust emissions often far outweigh controlled emissions from stacks, but with impacts limited to much closer to the source. Fugitive dust from the PolyMet Mine is thus not expected to significantly impact visibility in the BWCAW. However, the sources of fugitive dust at the Maturi Mine would be within two to four miles of the BWCAW boundary, and could be expected to add to the impacts of emissions from the processing facility.

The full extent of impacts of mining on the BWCAW and the South Kawishiwi/Birch Lake area will never be exactly predicted before a mine is built. As the EPA put it in its assessment of the risks of mining in the Bristol Bay watershed, “Risk assessments are inherently uncertain, because they must predict the occurrence and consequences of future actions.”⁹⁶ Even with a detailed mine plan, we would not know with certainty what the impacts would be, in part because mine plans change. Nonetheless, we *do* know that any industrial mine significantly alters the local landscape through deforestation, building and road construction, lighting, traffic, and noise. These are all unavoidable impacts of any large mine, and we have enough information now to know that the pristine beauty, silence, darkness and solitude of the South Kawishiwi/Birch Lake area and the nearby Lake Gabbro/Eagle’s Nest area of the BWCAW will not survive the construction of a mine.

Conclusion

Even as Congress continues to protect additional acres of wilderness, the wilderness we have erodes. The silence, the dark night skies, the sense of remoteness; the clean water, pristine air, native plants and ecosystems; the habitat acreage and corridors needed to sustain native species, all disappear to encroaching development. Mining brings that development to the doorstep of wilderness in the most intrusive way.

Perhaps more than for any other wilderness in the country, American citizens have stood up again and again to fight to retain the wilderness qualities of the Boundary Waters Canoe Area Wilderness. They have done so because the BWCAW speaks to them in a way of no other place they have known. Mining at the edge of the wilderness would ensure that this part of the BWCAW would no longer bring the deep joy that so many come here to find.

In closing, a last quote from Kevin Proescholdt:

In the half-light of dawn, the stars gradually faded as the sky barely, almost imperceptibly, began to lighten. The growing lightness of the sky overwhelmed the stars one by one. I enjoyed this time, not moving, but happily and intensely aware of the wilderness world around me slowly turning to light, slowly awakening to morning life.

⁹⁵ Minnesota Dept. of Resources et al., *NorthMet Mining Project and Land Exchange, Supplemental Draft Environmental Impact Statement* 5-416 to -417 (November 2013).

⁹⁶ *Supra* n. 71 at 4-1.

The hush surrounded us, overwhelmed us. The great wilderness silences remained complete.⁹⁷

⁹⁷ *Supra* n. 5 at 79.

Appendix A

DECLARATION OF STEVE KOSCHAK

Date: September 14, 2015

Re: Impacts of mining activity in the South Kawishiwi River area, Superior National Forest

1. My name is Steve Koschak
2. My address is 12007 River Point Road, Ely, Minnesota 55731, in Lake County.
3. My wife Mary Jane Koschak and I own and operate River Point Resort & Outfitting Company at the same address. Our facility is located on a peninsula where the South Kawishiwi River joins Birch Lake. We are four miles by water from the Boundary Waters Canoe Area Wilderness.
4. River Point Resort & Outfitting Company is a tourism and hospitality business that has been in operation since 1944. It was started by Frances and Frank Koschak, and has been owned and operated continually by the Koschak family since that time. River Point Resort offers lodging in the form of housekeeping cabins, along with auxiliary recreational opportunities such as swimming, boating, kayaking and canoeing, guided fishing, hiking and other family activities. We accommodate approximately 2,000 housekeeping guests per season, which runs from mid-May through mid-October.
5. River Point Outfitting Company outfits trips in the Boundary Waters Canoe Area Wilderness (BWCA), as a complement to our resort accommodations. Our outfitting business includes more than 100 canoes, and we outfit more than 775 people travelling in the BWCA in the course of a summer. We offer both partial and complete outfitting services, which can include meals, routing, maps and permits, and transportation to any of the approximately 30 entry points to the BWCA in the Ely area.
6. Our property consists of 44 acres, with one mile of shoreline, in the heart of the Superior National Forest. Prior to construction of the resort, this land had been unoccupied and undeveloped since the time of the Laurel Indians, who lived here about 500 years before the Common Era. The land includes a significant archeological site that was discovered in 1982, the first discovery of a site occupied by the Laurel Indians in the United States. An archeological covenant with the U.S. Forest Service protects this site on the south shoreline. The site is immediately adjacent to a proposed underwater tunnel to connect the Twin Metals Maturi mine to the concentrator site.
7. Until 2002, the land that we now own was part of the Superior National Forest, and we leased it from the U.S. Forest Service. Our business was considered an exemplary model

of a private/public partnership with the Forest Service, and government dignitaries flew in several times to see the property and speak with us about the partnership. We were able to purchase the land through a land exchange in 2002. I believe that a primary reason why we have maintained such a positive relationship with the Forest Service is that we have always considered ourselves to be stewards of the land, and have taken great care not to impact the water, air, or forest on and around this property – both before and after we received title.

8. Our property is in a beautiful location deep in the forest. It is sited on a private peninsula with no other roads, bounded on the east and west by the South Kawishiwi River. Birch Lake joins the river at the south shore of the property.
9. Birch Lake is twenty miles long, and about ninety percent of the shoreline is in federal ownership. Birch Lake is the only lake in the area outside of the BWCA where the Forest Service maintains boat-in, wilderness-style campsites, which provide unique camping opportunities for our guests and other visitors to the area. Birch Lake is home to two federal campgrounds, 17 dispersed campsites, a private campground, one additional resort, and two houseboat businesses. Birch Lake is similar to the large lakes found within the BWCA, and provides a wilderness-type experience to people who are unable to make a trip into the BWCA.
10. The BWCA lies four river miles to the east of our property, and is accessible from our property by canoe through Entry Point 32 (South Kawishiwi River). The South Kawishiwi takes a sharp turn to the north on the west side of our property, and flows through White Iron and Farm Lakes. It is also possible (although significantly farther) to access the BWCA through Farm Lake by that route. Finally, the river continues to flow north through Garden Lake and Fall Lake, and it is also possible to paddle into the BWCA and all the way to Basswood Lake and the Canadian border from our property. From our location in the headwaters of the Rainy River (BWCA) watershed, there are literally hundreds of miles of paddling (and other boating) opportunities both upstream and downstream.
11. People come to River Point Resort and Outfitting Company because of the incredible natural beauty and the wilderness setting. People come for the peace and tranquility of a place where they are completely buffered from the noise, sights, and stress of urban life. The property is all about nature, and that is what people come here for. We provide them with the comforts of home (but without TVs!), in a place where they can escape the chaos and craziness of their daily lives. People come here simply to sit on their screened porch, look at the river and forest, and listen to the sounds of nature. They come seeking equilibrium and spirituality as only a sojourn in a wild area can provide.

12. I believe that our location on the edge of the BWCA is the number one reason why our businesses are successful.
13. We have experienced impacts from mining activity for more than ten years. Twin Metals Minnesota (Antofagasta Chile) began drilling in the area in approximately 2006. A group of summer home owners adjacent to our property were coerced into a road-use agreement with the understanding that the mining company would cease exploratory drilling in their neighborhood in the summer months. However, the mining company did not negotiate with River Point Resort and Outfitting Company, and we have been subjected to drilling noise throughout the fall, winter and spring every year for many years. The noise occurred so frequently and for so long that we did not keep track of the dates and times. The noise has often been loud and constant enough that we do not open our windows. Whether it is because the birds aren't there or because we cannot hear them over the drilling noise, we did not hear the sound of birds around our property in the spring for several years, from 2006 through 2013. We did not realize how completely the birdsong had been missing during that time until the spring of 2014, after Twin Metals stopped drilling.
14. When drilling is being done, the noise is constant – day and night. In addition to drilling noise, we heard screeching and banging when drills were being changed, and heavy truck activity. The activity was sometimes close enough to us that we could hear the voices of the workers. We felt captive in our home, as we did not want to be outside in the noise. The whole point of living where we do is lost when we cannot be outside.
15. The constant barrage of sound is wearing on us mentally and emotionally; it adds a layer of stress that we would not otherwise experience. This became especially clear to us in 2014 when the noise stopped; the absence of the stress of noise made us realize how much of a burden it was. Nonetheless, the stress of living under the threat of losing our business and home to the mining industry is a constant deep dark cloud over us every day.
16. In the summer of 2013, Twin Metals continued drilling into the summer guest season. This was a significant disruption for our guests, and definitely impacted the quality of their experience here.
17. Although the agreement with Birch Lake summer home owners limited drilling in our vicinity in the summer, the company drilled in other locations during that time. In the summer of 2009 or 2010, we had a guest whom we had outfitted for a BWCA trip who came back reporting that her trip had been ruined by drilling noise. This was in the Gabbro Lake (Entry Point 33) area in the BWCA.

18. Prior to mineral exploration activities, we did not hear any similar noises. We rarely heard even the sound of a distant motor vehicle. Although we are within five miles of the Ely airport, ordinarily few planes fly over our property.
19. In early November of 2011 or 2012, about ten relatives and friends were here for deer hunting. At that time, Twin Metals had as many as eleven drill rigs going at one time. I was in my deer stand trying to listen for the sound of deer walking in the woods, and realized that I could not hear the sounds of the forest over the drilling. At that point I quit hunting on my property because of the noise. None of the people who had come were able to hunt here.
20. In the area where drilling for mineral exploration is being done, I am no longer able to access parts of the Superior National Forest where I used to go. Friends and neighbors who have hunted in the area for years have had to go elsewhere. The area is fragmented by roads that have been put in for mineral exploration and then gated, so that what used to be an open track is now a gated road. Mining activity has made this portion of the Superior National Forest less accessible to recreational users. This has always been a well-loved area devoted to recreational pursuits, and the permitting of mineral exploration has essentially privatized public land, dedicating it to the use of a mining company.
21. The mining company has also used aerial sonar for exploration, flying a large helicopter at low altitude, just above the tree tops. The helicopter would traverse very slowly, covering the entire area by sections and working in a grid. Once it had covered the area moving back and forth in two directions, it would move to transects in the other two directions, covering the same area. The helicopter would pass over our property many times – perhaps fifty times in one day. The noise was so loud that we would have to shout to be heard. This went on during the summer when we had guests, who were very disturbed by the noise and what felt like an invasion. This went on at least twice a week all summer one summer, which was either 2011 or 2012. I could see that the helicopter was also flying close to the edge of the BWCA, and am certain that the noise affected the wilderness area.
22. We complained about the helicopter noise, first to the Federal Aviation Administration who said there was nothing they could do, and then to our congressional delegation. After speaking with Senator Franken, the helicopter flights stopped. Shortly after that, three men in a boat spent a day right off our shoreline, doing seismic testing along the entire boundary of our property. I believe that the mining company was doing this to make a point, and that it was an act of harassment.

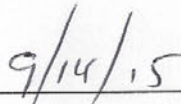
23. Even prior to 2006, we were impacted by the noise of Franconia drilling at the Birch Lake site, four miles down the lake. The noise funnels down the lake, so we heard it from our property, but the entire lake was also affected by auditory pollution for an entire summer. The noise was loud enough that I know it impacted the campsites around the lake. Our guests asked us about it all summer long, taking time away from our work and creating an anguishing situation for us, as we had no idea how long it would continue. I went on a tour of the Franconia drilling operation, and noticed that the noise was deafening in the immediate vicinity. I have some experience with sound abatement in the construction of buildings, and noticed that there was no attempt at sound abatement at the Franconia operation. I also saw that the drilling barge flew both an American and a pirate flag, which I felt was a statement of the mining company's attitude toward neighbors on the lake and the forest environment.
24. I also believe that our well water has been affected by the exploration activity. Kinnetico tests our water yearly, and in the last couple years the amount of iron in the water has increased dramatically. During that same time, we noticed that the water and bathtubs in some of the accommodations were turning brown. We have one well that has always had very pure water – the water has never needed treatment. The water in that well was particularly affected, and we worried through the summer of 2014 that we would lose that well. However, the drilling stopped that year, and the water cleared up through the summer and has remained clear.
25. During the same time frame, we noticed one year that when the ice receded from the shoreline in the spring, the entire shoreline was covered by reddish-brown, clay-like silt, which is something we have never seen here before. It just happened one year, which I believe was 2013, and has not happened again.
26. I have also seen Twin Metals water tanker trucks filling their tanks frequently, night and day, with water from the Kawishiwi and Birch Lake, for use in drilling. No monitoring is done, and to my knowledge they do not keep track of how much water they are using. I have been told that they can use up to 10,000 gallons per day without a permit, but I have not been able to obtain any information about how much water they are actually using. We had three years of drought – 2011, 2012 and 2013 – when the lake and river levels were very low, and I do not believe that this is a sustainable use of water.
27. I am aware of the Twin Metals mine plans, including the planned location of underground mines and surface facilities. I am aware of the amount of surface activity required to construct a mine of the size that is planned. There is no possibility that we would be able to continue operating our two businesses here if any mine is built in this area. The location simply would no longer offer the setting that our guests come here for. This would destroy the life we have created and the dreams and the legacy we want

to pass on to our son. Our life's work and investment will be lost. This would devastate us, certainly, but would also destroy the refuge of the thousands of guests that we serve every summer, along with Superior National Forest visitors who use Birch Lake, the Kawishiwi River, or the Gabbro Lake area in the BWCA.

I declare that to the best of my recollection and knowledge, the information herein is true.



(Signature)



(Date)

DECLARATION OF PAUL SCHURKE

Re: Impacts of mining activity in the South Kawishiwi River area, Superior National Forest

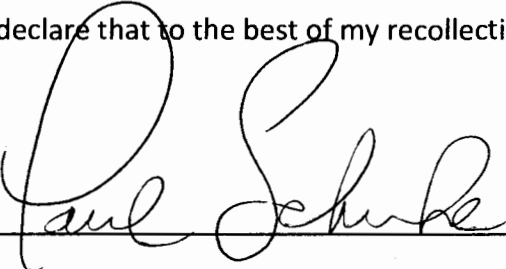
1. My name is Paul Schurke.
2. My address is 1101 Ring Rock Road, Ely, Minnesota 55731, in St. Louis County.
3. I own and operate Wintergreen Dogsled Lodge, which offers guided dogsled vacations during the winter season. We offer both lodge-based vacations, taking day trips out from our lodge, and camping trips, travelling and camping in the Boundary Waters Canoe Area Wilderness (BWCA). The trips are from 3 to 8 days long. We take about 100 trips per season, accommodating more than 500 people, who come from all over the world. We've been in business for thirty years.
4. I am also a co-founder of the nonprofit organization Wilderness Inquiry, and occasionally lead summer trips in the BWCAW for that organization.
5. Wintergreen Dogsled Lodge is located on White Iron Lake, a few miles southeast of Ely. The South Kawishiwi River flows into White Iron Lake just downstream of its confluence with Birch Lake. We are downstream of the locations on Birch Lake and the South Kawishiwi where Twin Metals hopes to establish copper/nickel mines.
6. Our property is strategically located so that we can take dogsled trips directly into the BWCAW without using trucks. The vast majority (about 90 percent) of our camping trips are routed into the BWCA near Farm Lake, and then up the Kawishiwi River or southeast to Gabbro and Bald Eagle lakes. We sometimes set up a base camp on Gabbro Lake and stay in that location for three nights. Gabbro Lake is about a mile inside the wilderness boundary and within a couple of miles of the mineral prospecting on Spruce Road, along the South Kawishiwi River.
7. Ordinarily, very few sounds of mechanized activity carry to this area. On a rare occasion we hear a very faint sound of traffic on Highway 1, which is more than five miles away. The Tomahawk Snowmobile Trail runs about three miles from Gabbro Lake, so we do occasionally hear snowmobiles, but the noise is infrequent, of short duration, distant and faint. I have noticed that snowmobile engines have been getting quieter in recent years.
8. I have experienced very significant noise from mineral exploration on my trips within the BWCA. During the winter of 2013 in particular, a lot of test drilling was being done in the South Kawishiwi area. The noise at Gabbro Lake was constant, 24-7, and was loud enough to be continually noticeable despite natural sounds. The noise had a grinding quality and was very unpleasant. We travelled and camped in other locations along that corridor as well, and found that the whole area was impacted by drilling noise. It was most noticeable at night. It became a frequent topic of conversation amongst our guests, especially around the campfire at night. It

was embarrassing for me and the other guides. People come from all over the world – very long distances – to experience the BWCA as a place “untrammeled by humans,” and then are subject to constant mechanical noise during key segments of their trip. My experience of the wilderness was negatively affected by the noise, and I believe my guests’ experience was negatively affected as well.

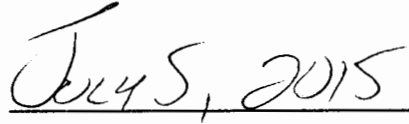
9. The increase in traffic on Highway 1 has been very noticeable in the last few years, with much of that traffic being mining exploration company trucks. Highway 1 is a state highway that runs between Ely and the North Shore of Lake Superior, a distance of about 70 miles. There is no incorporated town on this road south of Ely, and the road is thus ordinarily very lightly travelled, especially in winter.
10. I am familiar with Twin Metals’ plans, including both surface facilities and underground mines. I believe that surface work would be necessary for the Maturi Mine in closer proximity to Gabbro Lake than some of the drilling locations that I have heard from within the BWCA.
11. One of the things that guests are almost always struck by on their vacations at our lodge and in the BWCAW is the night sky. People come to be with the dogs, but the night sky ends up being a highlight of most people’s trip. In reviewing Twin Metals’ plans, I believe that light and dust from mining facilities and traffic will affect the clarity of the night sky, and will impact that aspect of people’s wilderness experience.
12. Twin Metals estimates that its mines would provide 850 jobs; that increase in traffic and human activity alone would impact people’s experience in this part of the Superior National Forest, both inside and outside of the wilderness.
13. If mining is permitted, I do not believe that people who know beforehand about the impact will choose to travel in this part of the wilderness. Based on my experience thus far, I believe that if mining is permitted, this part of the BWCA will be sacrificed to mining.
14. This is particularly unfortunate because the Gabbro-Bald Eagle Lakes area is one of the “favorite haunts” of the entire BWCA. The fishing is known to be exceptional, and the routes are beautiful and very accessible, with relatively short and easy portages and lakes that are not so large that they are overwhelming on a windy day. Usership and interest for the entry points in this area are some of the highest-ranking (within the top five) of any area within the BWCA.
15. I prefer the Gabbro-Bald Eagle area and believe it provides the best trip for my guests, but if noise continued in the future as it was in the winter of 2013, I would have no choice but to reroute the trips that I take.
16. I travel regularly in the Arctic and to other wilderness areas, and have been in some of the most remote places on the planet. However, I have found the same silence and immersion in nature here in the BWCA that I have found in more remote places. Sigurd Olson made the same observation; this place is as beautiful and pristine as anything out there. It is really quite

extraordinary to have this wilderness that is so accessible to populated areas. I have also found that the BWCA is unique amongst wilderness areas in that the beauty and grandeur are much more accessible to human beings. In many wilderness areas, the scale is superhuman; the mountains are spectacular, but they are also unreachable. The BWCA is wilderness on a human scale; you are a part of it every step and stroke of the way.

I declare that to the best of my recollection and knowledge, the information herein is true.



(Signature)



(Date)

DECLARATION OF RACHEL GARWIN

Re: Impacts of mining activity in the South Kawishiwi River area, Superior National Forest

1. My name is Rachel Garwin.
2. My address is 325 E. Front St, Apt 1, Missoula, MT 59802.
3. I worked at the Voyageur Outward Bound School (VOBS), on the South Kawishiwi River in the Superior National Forest, from 2008 to 2014. I started as a wilderness canoeing expedition instructor in the summer of 2008, and worked as an instructor the summers and falls of 2008-2010. I took the summer of 2011 off to go to graduate school, but came back as an instructor in 2012. Starting the winter of 2012-2013, I became a winter dogsledding/cross-country skiing instructor and continued working year-round for VOBS until fall of 2014. I left in September of 2014 after working the summer as a staff trainer, course director (supervisor of instructors), and senior instructor.
4. The mission of VOBS is to “change lives through challenge and discovery.” Outward Bound—and the educational philosophies upon which it is based—has a long history, but Outward Bound as we know it started in the UK during World War II. The educational pioneer, Kurt Hahn, was asked to develop a program that taught young sailors in the British Merchant Marine Service to overcome adversity and persevere through difficult situations like surviving in life boats in the North Atlantic Sea after their ships were torpedoed by German U-Boats. Hahn later used the principle of “learning through the sea” rather than for the sea at a prominent boys’ school that taught character, self-improvement, and service just as prominently as academic disciplines.

Founded in 1964, VOBS was the second Outward Bound school in the country (Colorado Outward Bound started in 1963). Bob Pieh, VOBS founder and a leader in education, ran a summer camp at the present-day location of the VOBS wilderness base near Ely, Minnesota. He heard about Outward Bound’s U.S. inception and realized that the Boundary Waters Canoe Area (BWCA) was a natural and obvious place for Outward Bound expeditions to take place. The untamed and expansive nature of the BWCA allowed (and still allows) extended, unsupported expeditions unlike most other places—even other wilderness areas—in the country. Many other Outward Bound course areas require resupplies and reliance on outside support to travel for weeks on end, but in the BWCA Wilderness (BWCAW), groups are able to carry their food, gear, and emergency supplies for 22-day wilderness expeditions. VOBS plays an important role in the history of Outward Bound and outdoor education in the US. VOBS was the first US Outward Bound school to accept girls and pioneered co-ed courses.

Today, VOBS welcomes students ages 14 and above to the BWCAW, including college students, fun-seeking adults, reflection-seeking adults, and military veterans. VOBS also has a base in the Twin Cities area, which delivers in-school programming, creates school and community partnerships, and offers expeditions closer to the Twin Cities. The Twin Cities programming often serves as a link or ladder to low-income or underserved youth to gain the comfort necessary to later embark on a wilderness expedition in the BWCAW.

VOBS's wilderness courses vary in length from 7 to 50 days. Most spring, summer, and fall courses involve canoeing in the BWCAW, though they may also involve backpacking along the Superior Hiking Trail or sea kayaking in Lake Superior. VOBS also offers winter dogsledding/cross-country skiing courses, which generally operate within the BWCAW unless occasional large groups require the use of the adjacent Superior National Forest.

Though each course varies based on its activities, conditions, instructors, and students, all share many things in common. Instructors teach students the skills to travel safely and comfortably in the wilderness and mentor the students as they develop increasing mastery. These skills include the obvious campcraft, paddling, and technical skills necessary for backcountry living, but also include social skills such as leadership/followership, communication, conflict resolution, providing positive and constructive feedback to self and others, goal setting, and other essentials for living in a small group of people. Periods of quiet reflection are built into the courses, both in informal moments while traveling and camping in a primitive wilderness area and in the formal "Solo" experience, which can last anywhere from 1-72 hours depending on the course circumstances and student population. The opportunities for students to overcome challenges, learn mastery of new skills and difficult situations, and reflect on their continuing accomplishments creates an atmosphere in which students gain self-confidence, a deeper sense of self, and an understanding of how they fit in the world around them. Together, these skills are beginning to be called "grit" or "resilience" in the educational and psychological literature, but they are familiar concepts to Outward Bound students and instructors.

5. The VOBS basecamp, Homeplace, is located at 1007 Spruce Road, Ely, MN 55731. The base is about 15 miles south and east of Ely, MN, and about 3.4 miles up Spruce Road from Highway One. It occupies a couple of dozen acres at the end of a peninsula where the South Kawishiwi River meets Birch Lake, a few miles downstream of where the South Kawishiwi River leaves the BWCAW. You can paddle and portage less than 3 miles up the South Kawishiwi River from Homeplace to BWCAW Entry Point #32, a very popular wilderness entry point.

6. Many VOBS courses end by paddling home, and groups will often spend their last nights in the wilderness in the S. Kawishiwi/3-Mile/Gabbro/Little Gabbro/Bald Eagle/Lake One area. This is an important time for students, as they are reflecting on the wilderness that has been their home for days or weeks and contemplating how to best bring their experiences forward into the rest of their lives once the course is over.
7. I am familiar with the location of the mineral deposits that Twin Metals hopes to mine in the area, based on documents generated by Twin Metals. Twin Metals' Spruce Road Deposit is a little farther up Spruce Road (toward the BWCAW) from VOBS, and the Maturi Deposit is between Highway One and VOBS along Spruce Road. Active prospecting activity undertaken since 2012 near Nickel and Omaday Lakes is within 3-4 miles from VOBS, as the crow flies. Twin Metals has applied for a special use permit to construct two well pads and drill numerous hydrogeologic wells along the USFS spur road connecting Spruce Road to the VOBS basecamp. Additionally, Twin Metals owns private land across the S. Kawishiwi River from VOBS to the north in the Crocket Lake area.
8. When I was at VOBS, we also used the Kawishiwi Summer Homes area along Birch Lake for a weekly event called the Personal Challenge Event (PCE). As a culmination of multi-week courses, students paddle 6 miles down from Homeplace, under the Highway 1 bridge, to a USFS campsite on Birch Lake. They then portage their canoe a mile to a waiting canoe trailer and run the remaining 6 miles back to Homeplace through the summer homes area and down Spruce Road. Legacy drill holes (and new drill pads) are scattered throughout the portage and running area of the PCE, and an early Twin Metals mine plan design located the mine facilities in the heart of the PCE area.
9. As a VOBS wilderness instructor, I worked with another instructor to develop a curriculum appropriate to the age and abilities of our incoming students. I taught students to paddle, portage, set up camp efficiently and effectively, provide feedback to themselves and to others, manage time, set and achieve goals, and reflect on their expeditions and lives. I tried to infuse a wilderness/land ethic into my courses, even with the more difficult students.

Many students—teens especially—had never been camping before, let alone traveled for multiple days in a wilderness. Once these teens learned that bears weren't always waiting around the corner and that it was okay to pee in the woods, they often ended up having the most transformational experiences. I remember a student from inner city Oakland, CA, telling me that she wasn't allowed to be outside at home because her mom feared for her safety. This student weighed about a hundred pounds, but by the end of the 3-week course, she could portage a 75-lb aluminum canoe on her shoulders. She was in awe of her own newfound strength and knowledge that she could push

through physical and mental obstacles and also marveled at the joys of being allowed to spend time outside, especially in the dark. I've taught teenaged boys deemed by their parents to be "on the wrong track" or disrespectful to their families and homes to communicate assertively with their peers and instructors. When introduced to the beauty and vastness of the BWCAW, these same "troubled" youth can show remarkable responsibility, integrity, and appreciation for their surrounding environments.

In addition to instructing teenagers, I also instructed a handful of courses for adults and military veterans. These courses tend to be shorter in length to accommodate adults' busy schedules and other responsibilities; however, they have even more of an impact than the teen courses because adults arrive primed for a transformative experience. For instance, I instructed an 8-day dogsledding/cross-country skiing course for women over 50. We designed a skills progression that allowed them to learn basic skiing, mushing, and camping skills in a low-stress environment and build those skills into a three-night overnight basecamping experience on the South Kawishiwi River on the edge of the BWCAW (incidentally, very near one of the proposed Twin Metals hydrogeologic study wells). These women were physically, mentally, and emotionally challenged in a highly supportive environment, which allowed them to share and reflect on their life stories in an empowering way.

Summer and winter courses for veterans of the Iraq and Afghanistan wars provide transformative experiences for an entirely different population. Many veterans struggle with adjusting to civilian life after their experiences overseas, whether it's due to formally diagnosed PTSD or suddenly lacking the structure, routine, and culture to which they became accustomed in the military. My role as an instructor on these courses was usually to teach the relevant wilderness skills, risk management considerations, and group norms, and allow the wilderness and a supportive group of peers work their magic. Burly men and women with regiment tattoos and irreverent, obscenity-laden stories would sit around the fire at night and share their struggles, fears, and weaknesses with others who had been strangers mere days before. At the end of every veterans course I instructed, the students thanked each other for creating an environment of understanding, peer support, and acceptance that they had been missing since returning from the military.

10. While I worked at VOBS (but wasn't in the BWCAW instructing a course), I lived at the wilderness basecamp, Homeplace. In the summer, staff are housed in buildings that require open windows for air circulation, which makes drilling, traffic, and other mechanical noises particularly intrusive and disruptive. In the winter, I spent a lot more time on base because courses were shorter and there were larger gaps between them.

In all seasons, I traveled frequently along Highway 1 and Spruce Road between Ely and Homeplace. These roads connect our area with the local grocery stores, restaurants, gas stations, video rental shops, bait/tackle shops, and outdoor gear stores. I also regularly drove up and down Spruce Road and Birch Lake Road while dropping off or picking up student groups at entry points or campsites along the South Kawishiwi River, Little Gabbro Lake, or Birch Lake. On a winter dogsledding/cross-country skiing course, I had the opportunity to ski by numerous drill pads in the Omaday Lake area. I've also witnessed drill rig teams pumping water out of Nickel Lake in the middle of winter and otherwise disturbing the peace and quiet of the National Forest adjacent to the BWCAW.

11. I was introduced to the BWCAW as a teenager when I was a student on a VOBS dogsledding/cross-country skiing course in 2001. We put in at the Snake River Entry Point near Bald Eagle Lake and slogged our way through deep, wet snow toward Gull Lake, averaging about 2 miles a day. Our last day consisted of a 10-mile push from Bald Eagle through Gabbro Lake to the Little Gabbro Lake Entry Point and along Spruce Road in order to get back to VOBS in time for our course-end activities. Fourteen years later, I still remember skiing along Spruce Road with a full moon overhead at the end of a 10-hour travel day, relying on sheer will to keep my legs moving. To this day, it was one of the hardest things I've ever done.

That first experience on an Outward Bound course in the BWCAW is a fundamental reason that I believe so strongly that wilderness must be protected. Proper wilderness stewardship requires difficult choices, but the benefits are worth so much in terms of the development of character and resilience in people young and old. I know that I would not have had such a powerful or transformative experience had I skied along Spruce Road at night having to dodge mining company trucks.

12. Homeplace is located where the South Kawishiwi River flows into Birch Lake at a place that we called Birch Bay. The end of the river and start of the lake is not clearly defined, and its location varies depending on what map you use. Regardless of the boundaries, however, the Birch Lake/South Kawishiwi area is an incredible area for recreation. I swam off the Homeplace dock almost every day I was on base in the summers and early falls, and paddled, windsurfed, and water skied in Birch Bay when the opportunities presented themselves. I have sailed a handful of times on the South Kawishiwi River near the Highway 1 bridge, and it feels like sailing in a wilderness area. I also regularly cross-country skied along the lake to the bridge and back in the winter. A friend and I even skied from Homeplace down Birch Lake to Babbitt—about a 22-mile ski and a very long day!

13. Within the BWCAW and west along the river to Homeplace, I know the South Kawishiwi River area like the back of my hand because of how many courses I've instructed that traveled through it. Almost all of the winter courses I instructed traveled along the South Kawishiwi River or the Gabbro Lake area due to its ease of access, ease of transportation logistics, and proximity to Homeplace. Most of the canoeing courses I instructed either started at Homeplace and paddled up the South Kawishiwi River through Entry Point 32 or ended at Homeplace by paddling down the river. On some shorter courses, I was dropped off at nearby entry points (such as #34-Island River or #30-Lake One) to create a manageable, one-way route back down the South Kawishiwi River or down the Little Isabella River through Bald Eagle, Gabbro, and Little Gabbro lakes.
14. The South Kawishiwi River/Gabbro/Bald Eagle areas are very popular, but also somehow retain a feeling of remoteness, despite being so close to the wilderness boundary. The varied types of water bodies are connected by short or moderate portages, which allows a high diversity of experiences compared to paddling on large border lakes for days at a time. Unlike many of the other popular entry points on Fall, Moose, or Basswood lakes, motors aren't allowed on any part of the rivers or lakes within this part of the wilderness, which creates an additional level of remoteness and solitude. The presence of the Weasel Primitive Management Area (PMA) to the north of Bald Eagle Lake provides an even wilder experience, as its portage trails are not maintained and there are no established campsites. Most other PMAs in the BWCAW are in remote corners of the wilderness, requiring days of travel to reach them. However, the Weasel PMA offers incredible opportunities for route finding, bushwhacking, and testing one's abilities in a truly remote setting—it would be rare to meet another party while in the PMA.

While these areas feel remote, they provide easy access for short trips or by beginners. The portages aren't particularly difficult (though some of the entry point portages are long), which helps create the ease of access. Additionally, the lakes are relatively small and have more varied shorelines compared to the large border lakes, Snowbank Lake, Fall Lake, and Moose Lake, which limits the amount of weather and wind paddlers have to battle. In the winter, these lakes are very popular for ice fishing, day trips on skis or snowshoes, and dogsledding excursions due to their proximity to entry points. In my winter experience, it was not uncommon to spend 4-5 days deeper in the BWCAW and all of a sudden come across multiple groups camped or ice fishing on Gabbro/Little Gabbro Lakes or the South Kawishiwi River just northeast of the wilderness boundary.

15. Mineral exploration activity in the South Kawishiwi area is noticeable and has impacted my experience both inside and outside of the BWCAW. The impact ranges in type, from there being increased traffic on Spruce Road and Highway 1 from commuting drill rig operators and other personnel (white pickup trucks), as well as the drill rigs, water

container trucks, and other heavy equipment (larger trucks). While living at the VOBS basecamp, I sometimes ran along Spruce Road for exercise, which increased traffic made more difficult due to dust and having to be more aware of vehicles. Driving personal vehicles—especially in winter—became more hazardous due to increased traffic.

On multiple occasions in 2013 and 2014 (and once in December 2012), I heard machinery, drilling, and other industrial noises either within the BWCAW or just outside of the border. I also heard and experienced industrial noise and activity while in the Nickel Lake area. On one memorable occasion, I was instructing a winter course in the Bogberry/Omaday Lake area, and heard a very loud “BOOM” to the north of me. Two other instructors who were each instructing different groups at the time also heard the same blast at the same time, and one was within the BWCAW. Additionally, old drill pads are noticeable and disrupt the appearance of that area of the National Forest. The vegetation does not appear to grow back in a way that makes the drill pads blend in with the rest of the forest, and the red drill plugs are very obvious. These drill pads or the roads cut to access them are also noticeable along Spruce Road and Birch Lake Road, two popular routes for recreationists to access both the BWCAW and Birch Lake/Birch Lake Campground.

While I have been within the BWCAW, I have experienced noise specifically from mining exploration and also noise from machinery/traffic that is not specifically attributable to one industry or another. Occasions when I made a note of the date and time follow; this is not a comprehensive list of the times I heard noise.

Date	Time	Activity	Location	Inside BWCAW?	Intrusion Type; Noise Level
12/3/12		Ski-pulk (with other staff)	Little Gabbro Lake	Yes	Blasting; Audible despite wind, hat, and hood
4/22/13	All afternoon and into evening	Dogsledding (with students)	S. Kawishiwi River, just north of Filson Winter Portage, at first designated campsite in BWCAW	Yes	Machinery and truck traffic (from south/toward Spruce Road); Loud enough to be heard over excited dogs and sounds of moving dogsled
4/22/13	11:30 PM	Dogsledding (with students)	S. Kawishiwi River, just north of Filson Winter Portage, at first designated campsite in BWCAW	Yes	Loud drilling all night, prevented quality sleep
6/29/13	8:30-9:00 PM	Canoeing (with students)	S. Kawishiwi River, 3rd Rapids Gaging Station	No, but very close	Booms and loud noises (rolling machinery?) to the south (Spruce Road direction).
7/1/13	6:10 AM	Canoeing (with students)	S. Kawishiwi River, just north of Filson Winter Portage, at first designated campsite in BWCAW	Yes	Low rumbling and machinery noise from the south (Spruce Road direction)

16. Hearing industrial noises—whether they are from drilling, truck engines, or other activities that require booms and explosions—has had an unfortunate impact on my wilderness experience. Wilderness, especially the BWCAW, is one of the last places in

the U.S. where one can escape from the constant noises of civilization and be reminded that there is a world significantly less governed by human will. The level of protection from noise—including one of the highest flight ceilings in the country—and other intrusions from industry the BWCAW enjoys promote this significant sense of quiet and solitude. When I hear noises from drilling or other heavy machinery, it brings civilization and industry back to the forefront of my mind. These noises disrupt opportunities for quiet reflection the wilderness is so suited to offer. The intrusive noise reduces the size of the de facto wilderness, even though the legal boundaries do not change.

17. When I have experienced noise intrusions while within the BWCAW, I have either been in the presence of other VOBS staff who have spent significant amounts of time in the BWCAW and other wild places or students for whom this their first meaningful interaction with wilderness. In some ways, their reactions were similar. They expressed shock that they are hearing noises from civilization within a federally protected wilderness area. They wished that the noise would cease so that it wouldn't distract them from the wilderness experience at hand. Finally, they hoped that the noises wouldn't come back or increase in the future. Most strikingly, even these temporary intrusions negatively impacted the students' experiences, which will be the only BWCAW experience many of them ever have. Since they will likely not return to the BWCAW, that temporary nuisance becomes a permanent impact, as they will carry that negative experience with them for the rest of their lives.
18. Based on my observations of my students noticing the noise from mineral exploration and other industrial activities, I believe that it annoyed them, disrupted their wilderness experience, and brought them back into more conscious contact with civilization. The noises also provided clues to my students that they actually weren't as far from civilization (and thus home) as they thought, and they had a much harder time letting go of homesickness and fully committing to the wilderness expedition experience. I've heard from others that drilling noises have reached into the Weasel Primitive Management Area, where students on shorter courses (especially adult students) sometimes have their "Solo" experience. Noise would certainly interfere with the purpose of Solo, which is both for quiet reflection and physical rest.
19. If noise similar to what I have heard on specific trips were likely to occur on any given trip, I expect that the South Kawishiwi River and Little Gabbro/Gabbro/Bald Eagle Lake area would significantly decrease in popularity. People have a lot of different reasons to undertake a wilderness trip, but research suggests that one of the most important is to get away from it all and experience awe-inspiring natural landscapes. Additionally, the BWCAW is well known for its "great silences," a term coined by Ely resident and wilderness advocate, Sigurd Olson. Should these great silences be marred by incessant drilling, occasional booming, truck traffic, or other industrial noises, this area of the

BWCAW would be a much poorer place for wilderness travel. Since it is an easily accessible, remote-feeling portion of the BWCAW that has a varied landscape and does not have motor access, it would be a great loss.

20. I am familiar with the mining plan Twin Metals proposed to its investors as part of its 2014 Pre-Feasibility Study, as well as the location of its four deposits, the methods with which it has proposed to mine the deposits, and the necessary and related surface infrastructure that would be required to develop an underground mine of this size.

The Twin Metals plans call for ventilation shafts, access tunnels, massive high voltage power lines, a spider web of process chemical and tailings pipelines, and a 1,000-acre concentrator plant on the surface above or close to their deposits. Ventilation shafts are noisy and have the potential to blow dust into the air, marring air quality and visibility. The mine—and thus concentrator plant—is supposed to operate 24-hours-a-day, year-round, meaning that light pollution would dim the brilliant night sky of the BWCAW. Pipeline and electrical transmission line right-of-ways would need to be cut through the forest, and access roads would be created to maintain them. Four paste plants—effectively cement mixing plants—are proposed to be located on top of the Maturi and Maturi SW deposits, with their own terrestrial ecosystem, light, and noise impacts. These structures would be visible and audible to visitors traveling to the BWCAW along Highway 1, accessing the BWCAW along Spruce Road, and people trying to recreate on Birch Lake, especially at the Birch Lake Campground. Finally, anglers, hunters, and wildlife watchers would likely find that their quarry were disturbed by all of the industrial activity present in the area and would have their experiences marred by it as well.

Twin Metals has boasted a 100-year life of mine in the past, which includes developing the Spruce Road and Birch Lake deposits. The federal mineral lease that governs the Spruce Road Deposit directly abuts the BWCAW boundary, and the deposit was originally proposed as an open pit mine when it was first discovered decades ago. Developing the Spruce Road Deposit, as close as it is to the BWCAW, would have permanent negative effects on the wilderness character of that area of the BWCAW.

21. Twin Metals anticipates having 850 employees who would commute to the mine and concentrator sites, in addition to truck traffic between the concentrator site and portals. The concentrator site and mine access portals are located to the south of Highway 1 close to Birch Lake. The daily commute of mine employees would significantly increase traffic along Highway 1, which is a narrow, curvy 2-lane country road. Traffic would increase at multiple times a day due to there being multiple shift changes, and it would create additional hazards for visitors traveling from Ely to Birch Lake or BWCAW entry points along Highway 1. Wilderness travelers would experience congestion

unprecedented in the area, which could steer people away from the area in general. Additionally, the noise from increased traffic could penetrate farther into the BWCAW and impact recreation opportunities on Birch Lake.

I declare that to the best of my recollection and knowledge, the information herein is true.

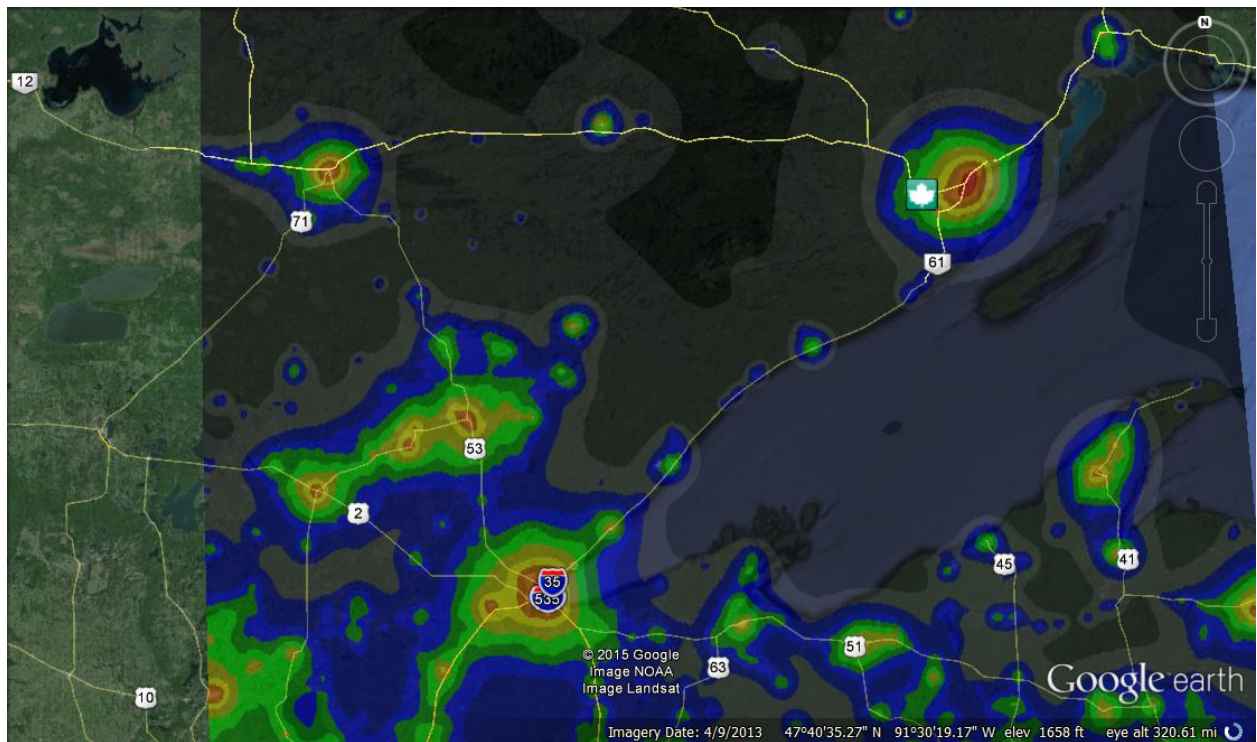


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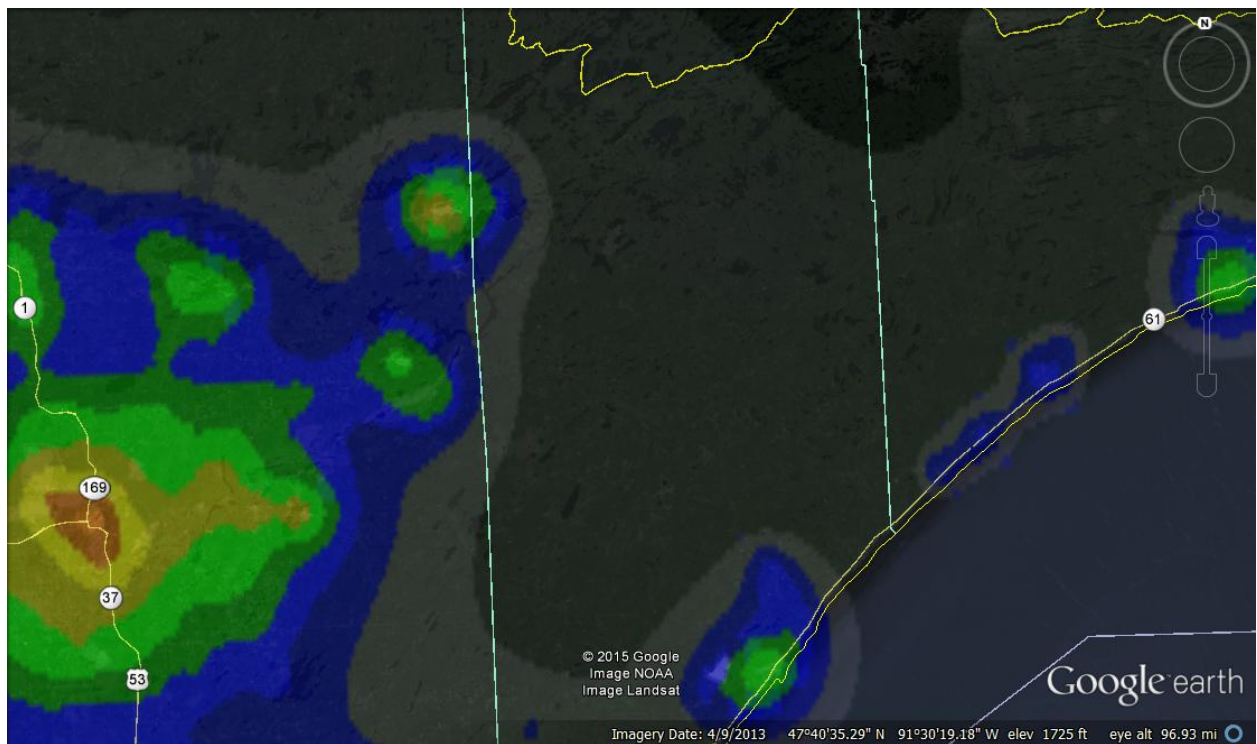
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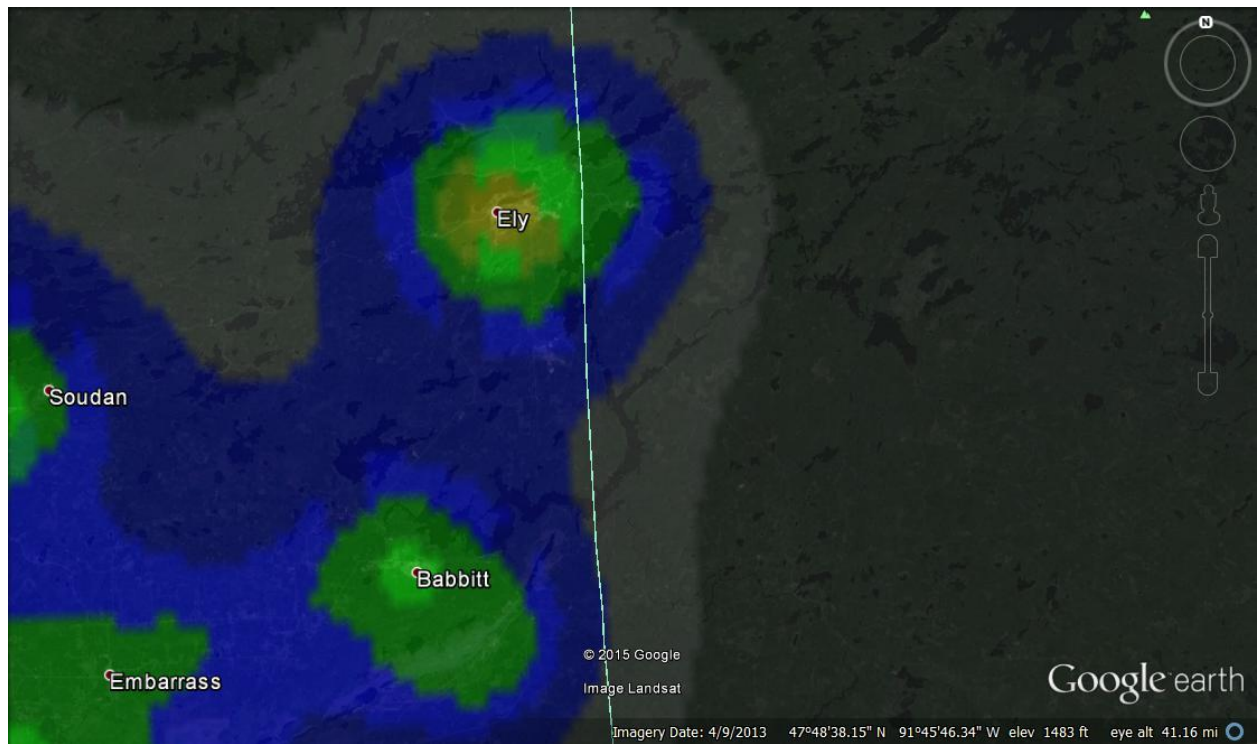
Appendix B



Google Earth, Light pollution surrounding Superior National Forest



Google Earth, Light pollution near Birch Lake, intermediate scale



Google Earth, Light Pollution in the Birch Lake Area