Logo	Department	Organization Information	Organization Address Information
	Forest Service	**Washington Office**	**1400 Independence Avenue, SW** **Washington, D.C. 20250**

File Code: 1950 **Date:** April 3, 2020

Route To:

Subject: COVID-19 Pandemic New Comment or Objection Filing Period Guidance

To: Regional Foresters

As efforts to slow the spread of COVID-19 continue across the nation, we are regularly evaluating the challenges to delivering National Forest management. Our focus is on the safety of our employees, the communities we serve, and slowing the spread of this virus. This letter is in response to requests from the field to provide guidance and highlight considerations that should be made for public engagement activities associated with environmental analyses under the National Environmental Policy Act (NEPA) and National Forest Management Act (NFMA) in support of project and land management planning efforts. This guidance may change in the future and is framed with the principle that local line officers make risk- based decisions that are founded on employee and community safety first. It also provides flexibility to adapt agency practice to local and evolving situations.

Given the unprecedented nature of the disruptions occurring across the country and around the world, individuals, organizations, and governments normally engaged in National Forest management activities in many cases have their attention profoundly redirected due to the pandemic and the need to establish personal and community physical distancing and other health prevention efforts. Several factors can make public engagement exceptionally challenging in this situation. These include but are not limited to:

- Inability, legally or otherwise, to hold public meetings or field trips;
- Lack of access to virtual technology for interested parties and stakeholders;
- Lack of Personal Protective Equipment for Forest Service employees to manage public interactions/comments;
- Closures of facilities where hardcopy documents are typically made available;
- Physical distancing recommendations resulting in lack of access to postal facilities and Forest Service mailrooms;
- Reductions or closures in tribal, state, county, or local government operations or services
- Reductions in capacity within stakeholder organizations;
- Reductions in Forest Service capacity due to self-quarantines, sick leave, or a redirection of resources to support government wide COVID-19 responses;
- State, county, reservation, or city-wide stay-at-home orders;
- A nation focused on economic hardship, loss of employment and wealth, risk to themselves, family and friends, and the strains placed on society generally.

It is important that we strive to deliver goods and services the American people derive from their National Forests and Grasslands, which in many cases are foundational to local and regional economies. We must do this with the safety of our employees and the public first and foremost in mind.

Consistent with our agency values responsible officials should carefully evaluate the initiation of new public comment or objection periods, and carefully consider how to manage ongoing public comment and objection periods given the factors listed above.

<u>Comment Periods and Objections for Project-level Analyses under NEPA</u>

Several factors should be evaluated regarding new comment or objection filing periods for project-level activities. These may be interrelated, and no one factor is controlling. These include but may not be limited to:

- The scope and complexity of the analysis and the likely degree of public interest
    - Not all analyses and decisions require the same level of public engagement. Some decisions, such as those related to existing special use authorizations that do not normally have significant effects, may be executed without requiring extensive or in-person public engagement. Complex analyses in which significant effects are uncertain or likely that are analyzed in an environmental assessment (EA) or environmental impact statement (EIS) may be necessary to delay.
- Federal, state, tribal, or local public health direction
    - The ability to conduct public engagement without compromising recommended physical distancing practices should be carefully evaluated. Special consideration should be given to the ability to engage if state, county, city-wide, or tribal nation stay-at-home orders have been issued.
- The ability of interested governments, organizations and individuals to engage
    - Evaluate government operations. If state, county, and tribal governments and their agencies and elected officials have curtailed services and operations they may not be able to focus resources on necessary review and response to proposed Forest Service activities.
    - Evaluate the ability for federally recognized tribes to engage in meaningful consultation, particularly if this typically occurs in-person.
- The importance of the activity for economic activity or stimulus
    - Not all proposed actions have equivalent economic effects. Activities associated with critical infrastructure, that support pandemic response, or that will help position a community to recover economically following the pandemic may need to proceed on established timelines. Work that is important for the health, diversity, and productivity of the National Forests and is not a major driver of economic activity may be appropriate to delay.
- The ability of interested parties to engage using virtual technology
    - Evaluate the availability of internet connectivity and the capabilities of interested parties, both organizations and individuals, to access and operate in virtual environments. Conference calls may provide an adequate alternative in some cases.

If this evaluation leads to the conclusion that meaningful public engagement will be challenging or unachievable under the current circumstances, responsible officials should carefully consider the timing of beginning new public comment periods.

Regulations at 36 CFR 218 do not allow for extension of objection filing periods. Responsible officials should carefully consider the timing of entering into new objection periods. Those actions deemed most critical for safety, economic recovery, or critical infrastructure should be prioritized to move forward. Consider the use of emergency NEPA procedures or Emergency Situation Determinations when and where appropriate.

Comment and Objection Periods for Analyses Supporting Land Management Planning

Robust public engagement is required by the 2012 Planning Rule and is critical for land management planning efforts to be successful and supported as they are implemented over time. The land management planning process and documents can be extensive and complex. For these reasons, responsible officials should consider if delaying the filing of Notices of Intent or Notices of Availability and associated legal notices to initiate scoping periods or comment periods on draft EISs on Land Management Plans is appropriate until conditions allow for robust public engagement and meaningful tribal consultation.

Regulations at 36 CFR 219 do not allow for extension of objection filing periods on final EISs and draft Records of Decision. Responsible officials should conduct a thorough sensing with local, state, and tribal governments and commenters prior to considering initiation of new objection filing periods.

Ongoing Public Comment or Objection Filing and Response Periods

For comment periods already underway, responsible officials should use factors described above and any other locally-applicable factors to consider extension of comment periods, especially for more complex documents such as EISs. Guidance for filing extended comment periods has been shared with Regional Planning Directors.

Regulations at 36 CFR 218 and 219 do not allow for extension of objection filing periods. Depending on the nature, complexity, and public interest in the proposed action and draft decision, and recognizing that each situation is unique and dynamic, reviewing officers should consider whether it is appropriate to set aside the current filing period and have the responsible official file a second notice of opportunity to object. This decision should be made to ensure that affected parties receive a full opportunity to help shape a final decision, consistent with the spirit and intent of the regulations. Reviewing officials should give notice to all eligible objectors of their intent to provide this second objection period by appropriate means.

Responsible officials should evaluate and consider whether extending objection response periods consistent with 36 CFR 218 and 219 procedures is appropriate. Blanket determinations, without a case by case careful consideration of the scope, complexity, or controversy associated with each decision, should be avoided.

For questions or additional guidance, please contact the Ecosystem Management Coordination Director Christine Dawe at christine.dawe@usda.gov or her staff in the Washington Office.

Forest Service employees should continue to take advantage of creative means to make meaningful progress in the analysis of proposed actions and drafting of environmental documents so we are poised to re-engage with state and local governments, stakeholders, tribes, and public as conditions warrant.

Sincerely,

X ______________________

CHRISTOPHER B. FRENCH
Deputy Chief, National Forest System

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WORKSHEET – Roadless Area Characteristics

Evaluating the Effects of Project Activities on Roadless Area Characteristics

Date:	September 17, 2019
Forest/District:	PSICC / South Park Ranger District
Roadless Area:	Puma Hills

Description of Project Activity or Impact to Roadless Area:
Within the Puma Hills CRA, treatment is proposed on two polygons: one within the Pulver Gulch treatment area (167 acres) and one within the Caylor Gulch treatment area (3,055 acres). Within the Caylor Gulch treatment polygon, mechanized mastication is proposed for 1,166 acres, and hand thinning (using chainsaws) is proposed for 1,211 acres, most of which overlap the acres proposed for mastication. In addition, all acres (both polygons) are proposed for prescribed burning, either after other vegetation removal or as a stand-alone treatment. The Forest Service would define where these methods would be appropriate, based on the distance to the boundary of the CRA and adjacent communities, road access, and slope considerations. Generally, areas with slope below 40–45 percent could be treated; some steeper terrain may also be included at the edges of this treatment polygon. There would be zero miles of road construction and reconstruction in the Puma Hills CRA.

Potential Effects to Roadless Area Characteristics

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
1- High quality or undisturbed soil, water or air resources These three key resources are the foundation upon which other resource values and outputs depend. Healthy watersheds provide clean water for domestic, agricultural, and industrial uses; help maintain abundant and healthy fish and wildlife populations; and are the basis for many forms of outdoor recreation.	Yes	Downward then Improving	The treatments proposed in roadless areas would occur in three watersheds: Pulver Gulch, Elevenmile Canyon, and Elevenmile Reservoir. Potential effects to hydrological and soil resources were determined to be greatest for the Pulver Gulch watershed, of which only a small portion occurs in the CRA. Effects were modelled as changes to peak flows, water yield, and sediment yield. Given the timing of treatments (phasing vegetation removal and prescribed burning) and the application of BMP's, effects to sedimentation were predicted to be minor but negative in the short term and improve the positive effects in the long term as the understory community recovers.
2 - Sources of public drinking water National forests contain watersheds that are important sources of public drinking water. Careful management of these watersheds is crucial in maintaining the flow of clean water to a growing population.	Yes	Stable yield, Downward then Improving sedimentation	The treatments proposed in roadless areas would occur in three watersheds: Pulver Gulch, Elevenmile Canyon, and Elevenmile Reservoir. Potential effects to hydrological and soil resources were determined to be greatest for the Pulver Gulch watershed, of which only a small portion occurs in the CRA. Effects were modelled as changes to peak flows, water yield, and sediment yield. Given the timing of treatments (phasing vegetation removal and prescribed burning) and the application of BMP's, effects to peak flow and water yield were predicted to be minor but increasing in the short term due to direct impacts from treatments but were not expected to adversely affect beneficial uses of the watersheds. Effects to

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
			sedimentation were predicted to be minor but negative in the short term due to direct impacts from treatments and improve the positive effects in the long term as the understory community recovers.
3 - Diversity of plant and animal communities*.* Roadless areas are more likely than roaded areas to support greater ecosystem health, including a diversity of native and desired non-native plant and animal communities, due to the absence of disturbances caused by roads and accompanying activities. Roadless areas also may conserve native biodiversity by serving as a bulwark against the spread of nonnative invasive species.	Yes	Downward then Improving	No unique plant or animal communities were identified in the roadless areas considered for treatment. Vegetation treatments are designed to reduce fuel levels near private land and infrastructure and increase stand heterogeneity across the units. As such, short term effects may be downward but minor immediately following implementation but are expected to improve community structure over the long term. Potential increases in noxious weeds will be minimized using BMPs and monitoring.
4 - Habitat for TES and species dependent on large undisturbed areas of land Roadless areas function as biological strongholds and refuges for many species, including terrestrial and aquatic plant and animal species. Many of the nation's species currently listed as threatened, endangered, or proposed for listing under the Endangered Species Act, and those listed by the Forest Service as sensitive, might have habitat within roadless areas.	Yes	Stable	Vegetation treatments would occur in potential Mexican spotted owl and Canada lynx habitat, although neither species is known to or expected to occur within the project area. No critical habitat has been designated in the project area. Given the phasing of vegetation removal and prescribed burning, the criteria to avoid areas of highest quality lynx habitat, and the low potential for occupation, the effects analyses resulted in a "may affect, not likely to adversely affect" determination for Mexican spotted owl and Canada lynx. Analysis of potential effects resulted in a "no effect" determination for North American wolverine. The US Fish & Wildlife Service has concurred with these determinations. Twenty-one species identified on the Regional Forester Sensitive Species list may occur in the project area and may be affected by project activities. Potential adverse effects to these species were predicted to be minor and temporary, resulting in a determination that the proposed action may "adversely affect individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing" for most of the Sensitive species. The proposed action was determined to have a potential beneficial impact on Rocky Mountain bighorn sheep and the American peregrine falcon.

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
5 - Primitive and semi-primitive classes of recreation These types of dispersed recreation often occur in roadless areas, providing opportunities for hiking, camping, wildlife viewing, hunting, fishing, and cross-country skiing. Although roadless areas with these recreation opportunities could have many wilderness-like attributes, they often allow the use of mountain bikes and other mechanized and motorized means of travel, in contrast to designated wilderness areas. Primitive, semi-primitive non-motorized, and semi-primitive motorized areas can also take pressure off heavily used wilderness areas by providing additional solitude and quiet, and dispersed recreation opportunities.	Yes	Stable	Backcountry access and recreation are the primary activities within the affected roadless areas, and these activities are likely to be affected by temporary closures during implementation. Potential increases in unauthorized motorized recreation in the area (there are no designated motorized routes) will be minimized by establishing barriers to entry after treatment and monitoring the area. Vegetation treatments and understory prescribed burning may reduce the visual appeal of the areas, but these reductions are expected to be localized and short term in nature, with visual characteristics improving due to greater heterogeneity of structure.
6 - Reference landscapes for research study or interpretation The body of knowledge about the effects of management activities over long periods of time and on large landscapes is very limited. Reference landscapes can provide comparison areas for evaluation and monitoring. These areas provide a natural setting that may be useful as a comparison to study the effects of more intensely managed areas.	Yes	Downward then Stable to Improving	No unique landscape features have been identified in the treatment area. The Puma Hills CRA is within the Northern Parks and Ranges Eco-Section (M331I) with elevations ranging from 5,575 to 14,410 feet. The vegetation is predominately Douglas-fir mixed with some areas of Engelmann spruce, subalpine fir, aspen, and ponderosa pine in the lower elevation areas and a small area of mountain grasslands and meadows in the west. The roadless area contains several types of large wildlife (mammals). The Caylor Gulch area drains to Elevenmile Reservoir, one source of water for the Denver Water's system. The entire CRA is in the WUI that surrounds private land and residences along Park County Road 92. The proposed treatments to modify fire behavior and protect the surrounding infrastructure and reservoir would occur on a maximum of 3,221.6 acres of the 8.8000-acre CRA, leaving a majority of the CRA for reference applications.
7 - Landscape character and integrity High quality scenery, especially scenery with natural-appearing landscapes, is a primary reason that people choose to recreate in or around an area. Quality scenery contributes directly to real estate	Yes	Downward then Improving	Simulations of effects from proposed activities indicated that initial impacts of prescribed burning would not be consistent with areas having a visual quality objectives (VQO) of modification or partial retention. However, treatments (like prescribed fire) that increase ecological diversity usually enhance scenic beauty if it initiates natural

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
values in neighboring communities and residential areas.			growth patterns and shapes. Thus, reintroduction of fire into the CRA is expected to increase the landscape character in the medium to long term.
8 - Traditional cultural properties and sacred sites Roadless areas may contain traditional cultural properties and sacred sites. Traditional cultural properties are places, sites, structures, districts, or objects that are historically significant in the beliefs, customs, and practices of a community. Sacred sites are places that are determined sacred by virtue of their established religious significance to or ceremonial use by a Native American religion. Federal agencies are to accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners, and are to avoid adversely affecting traditional cultural properties and sacred sites, when practicable.	No		No known traditional cultural properties or sacred sites were identified in the cultural resources analysis. Compliance with heritage resource protection measures as required by two Programmatic Agreements with the Colorado State Historic Preservation Office (Bark Beetle Management, Hazardous Fuel and Tree Reduction Programs, and Prescribed Broadcast Burning) will mitigate any potential effects, and result in no adverse effect finding.
9 - Other locally unique characteristics Roadless areas can offer unique characteristics that are not covered by the other categories. Examples include uncommon geological formations, which are valued for their scientific and scenic qualities, or unique wetland complexes. Unique social, cultural, or historical characteristics could depend on the roadless character of the landscape. Examples include places for local events, areas prized for collection of non-timber forest products, or exceptional hunting and fishing opportunities.	No		No other locally unique characteristics have been documented for this roadless area other than those described above.

Summary	Will the project maintain or improve roadless area characteristics?	No	Yes	Summarize the findings
	Short term?	X		Short term, potentially negative effects to the soil and water resources (sedimentation), biodiversity of the local community, potential as reference landscape, and landscape characteristics (visual component) may occur within the roadless areas following vegetation treatments. These effects were found to be non-significant and short in duration due to the types of treatments and resulting improvement in vegetation heterogeneity and structure.
	Long term?		X	Reducing the potential for catastrophic wildfire and insect or disease outbreaks and returning fire to a more natural role in the forest ecosystem (both of which are identified as needs for this proposal) will help improve forest structure and function and landscape characteristics in the long term. Analyses indicate that for those resources that would be non-significantly adversely affected in the short term, the treatments would result in a long term beneficial outcome for roadless characteristics.

Marla Nelson <mfox@wildearthguardians.org>

LaVA Project Objection - Request for Additional Time

4 messages

Marla Fox <mfox@wildearthguardians.org> Fri, May 8, 2020 at 11:32 AM
To: "Martin, Melissa M -FS" <melissa.m.martin@usda.gov>, vog.adsu@nocab.llessur
Cc: Adam Rissien <arissien@wildearthguardians.org>, Ted Zukoski <tzukoski@biologicaldiversity.org>
Bcc: "H. Duane Keown" <DKeown@uwyo.edu>, Connie Wilbert <connie.wilbert@sierraclub.org>

Hello Ms. Martin and Forest Supervisor Bacon,

WildEarth Guardians requests the Forest Service provide additional time for objections to the MFEIS and Reissued DROD for the LaVA Project. More than 30 days is necessary for the public to meaningfully review and respond to changes--especially in light of the large spatial scope and temporal extent of this project, and current "stay at home" orders due to the COVID-19 pandemic. Due to state "stay at home" orders to control the spread of COVID-19, many members of the public are now working from home, without childcare or similar support for the regular course of business. *See, e.g.*, April 3, 2020 U.S. Forest Service, Washington Office, COVID-19 Pandemic New Comment or Objection Filing Period Guidance to Regional Foresters (noting "[s]everal factors can make public engagement exceptionally challenging" during the pandemic, including but not limited to "[r]eductions in capacity within stakeholder organizations"; "State, county, reservation, or city-wide stay-at-home orders"; and "A nation focused on economic hardship, loss of employment and wealth, risk to themselves, family and friends, and the strains placed on society generally."). These circumstances are ongoing throughout the entirety of this objection period warrant providing more than 30 days for the public to review and object.

The size and scale of this project also warrant additional time. Indeed, the Forest Service itself required more than a 30-day response period to respond to objections raised in 2019. *See* DROD at 6 (noting the Forest Service needed more than the HFRA 30 days to review and analyze regional recommendations to respond to public concerns and strengthen the analysis in response to objections). The Forest Service conducted additional analysis in the MFEIS and revised specialist reports over the course of almost one year. *Id.* Plus, the Forest Service continues to add new reports and documentation to the analysis tab on the project website after the objection period began (for example, a "Final" Transportation Report on May 7, 2020, "Final" Invasive Plants Report on May 1, 2020, FWS concurrence on April 20, and Barrett Cr. Stream Health assessment, in addition to others). The public needs more than 30 days to meaningfully review these documents and changes to provide an informed objection. In the very least, the public should be given 30 days from the date all documentation on the project website is final to review and object. It is unreasonable to expect the public to continue checking for updates to project documentation in addition to reviewing the already voluminous project materials during the 30-day objection period.

We request additional time for objections to the MFEIS and Reissued DROD for the LaVA Project. In the alternative, we request that you provide a new round of 30-day objection period.

Best,
Marla Fox

--

WildEarth GUARDIANS A FORCE FOR NATURE
MARLA FOX, JD
STAFF ATTORNEY
mfox@wildearthguardians.org
651-434-7737
Follow @wildearthguard
WildEarth Guardians | PO Box 13086 | Portland, OR 97213
www.wildearthguardians.org

Mail Delivery Subsystem <mailer-daemon@googlemail.com> Fri, May 8, 2020 at 11:32 AM
To: mfox@wildearthguardians.org

Address not found

Your message wasn't delivered to **vog.adsu@nocab.llessur** because the domain nocab.llessur couldn't be found. Check for typos or unnecessary spaces and try again.

The response was:

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DNS Error: 2689661 DNS type 'mx' lookup of nocab.llessur responded with code NXDOMAIN
Domain name not found: nocab.llessur
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Final-Recipient: rfc822; vog.adsu@nocab.llessur
Action: failed
Status: 4.0.0
Diagnostic-Code: smtp; DNS Error: 2689661 DNS type 'mx' lookup of nocab.llessur responded with code NXDOMAIN
Domain name not found: nocab.llessur
Last-Attempt-Date: Fri, 08 May 2020 11:32:34 -0700 (PDT)

---------- Forwarded message ----------
From: Marla Fox <mfox@wildearthguardians.org>
To: "Martin, Melissa M -FS" <melissa.m.martin@usda.gov>, vog.adsu@nocab.llessur
Cc: Adam Rissien <arissien@wildearthguardians.org>, Ted Zukoski <tzukoski@biologicaldiversity.org>
Bcc:
Date: Fri, 8 May 2020 11:32:23 -0700
Subject: LaVA Project Objection - Request for Additional Time
Hello Ms. Martin and Forest Supervisor Bacon,

WildEarth Guardians requests the Forest Service provide additional time for objections to the MFEIS and Reissued DROD for the LaVA Project. More than 30 days is necessary for the public to meaningfully review and respond to changes--especially in light of the large spatial scope and temporal extent of this project, and current "stay at home" orders due to the COVID-19 pandemic. Due to state "s ----- Message truncated -----

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Marla Fox <mfox@wildearthguardians.org> Fri, May 8, 2020 at 11:33 AM
To: russell.bacon@usda.gov
Bcc: "H. Duane Keown" <DKeown@uwyo.edu>

[Quoted text hidden]
--

WildEarth GUARDIANS
A FORCE FOR NATURE

MARLA FOX, JD
STAFF ATTORNEY

mfox@wildearthguardians.org
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Follow @wildearthguard

WildEarth Guardians | PO Box 13086 | Portland, OR 97213
www.wildearthguardians.org

Bacon, Russell M -FS <russell.bacon@usda.gov> Fri, May 8, 2020 at 2:03 PM
To: Marla Fox <mfox@wildearthguardians.org>

Ms. Fox,

Thank you for your email requesting an extension to the objection period for the LaVA FEIS and DROD. Prior to the initiation of the objection filing period, I carefully considered the guidance you referenced in your email (*April 3, 2020 U.S. Forest Service, Washington Office, COVID-19 Pandemic New Comment or Objection Filing Period Guidance to Regional Foresters*). Due to the pressing need to address the significant wildland fire hazards to communities, the public and agency employees and critical water supply infrastructure within this project area as well as the overhead hazard tree threat to the safety of the public and employees I felt that delaying the initiation of the objection filing period would not be prudent. I also considered the extensive public engagement to date as well as the factors identified related to public engagement in the guidance document.

Regulations at 36 CFR 218 do not allow for extension of objection filing periods, therefore your request cannot be granted.

Thank You,

Russ Bacon

Russ Bacon
Forest Supervisor

Forest Service
Medicine Bow - Routt National Forests and Thunder Basin National Grasslands

p: 307-745-2400
c: 970-596-0886
russell.bacon@usda.gov

2468 Jackson Street
Laramie, WY 82070
www.fs.fed.us

Caring for the land and serving people

From: Marla Fox <mfox@wildearthguardians.org>
Sent: Friday, May 8, 2020 12:33 PM
To: Bacon, Russell M -FS <russell.bacon@usda.gov>
Subject: Fwd: LaVA Project Objection - Request for Additional Time

[Quoted text hidden]

From: "Martin, Melissa M -FS" <melissa.m.martin@usda.gov>
Subject: RE: LaVA Roadless Approval
Date: June 24, 2017 at 10:26:31 AM PDT
To: "Schillie, Trey C -FS" <trey.schillie@usda.gov>
Cc: "Martin, Melissa M -FS" <melissa.m.martin@usda.gov>

Hi Trey. On June 13, 2017, the MBRTB met with Jacque Buchanan to review our pre-scoping roadless proposal for our Medicine Bow LaVA Project. The proposal included 125,222 acres of what we're calling 'treatment opportunity areas' (TOAs) in Inventoried Roadless Areas (IRAs). During the meeting, we requested approval to move TOAs that fall within the IRAs forward as part of our Proposed Action for scoping, indicating that no site-specific treatment units have been identified – that will come later, during project implementation. The TOAs merely identify where opportunities could exist, based on law, regulation, and policy and have not yet undergone site-specific analysis. To make a long story short, Jacque agreed to allow us to include the 125,222 acres of TOAs as part of our proposed action.

Please let me know if you need anything more. Thank you. ~Melissa

From: Schillie, Trey C -FS
Sent: Friday, June 23, 2017 2:27 PM
To: Martin, Melissa M -FS <mmmartin@fs.fed.us>
Subject: RE: LaVA Roadless Approval

Hi Melissa – Sorry we did not get a chance to talk today. I would recommend just sending an email to me to document the approval (similar to the one you already sent). We can sort out the details later.

From: Martin, Melissa M -FS
Sent: Thursday, June 22, 2017 4:58 PM
To: Schillie, Trey C -FS <tschillie@fs.fed.us>
Subject: RE: LaVA Roadless Approval

Hi Trey. Jacque approved us to move forward on the whole pre-scoping proposal, as submitted. That included 125,222 acres of what we're calling ‘treatment opportunity areas’ (TOAs) - equates to 54% of all our roadless acres (230,240).

This could be a long email…I think I’ll give you a call to explain…it’s different than the Region’s used to. Hopefully you’re in tomorrow ☺

From: Schillie, Trey C -FS
Sent: Thursday, June 22, 2017 9:57 AM
To: Martin, Melissa M -FS <mmmartin@fs.fed.us>
Subject: RE: LaVA Roadless Approval

Hi Melissa,

Since I was not there, can you send me an email that documents what was approved? Specifically, if there was any agreement on the tiered approval approach that you proposed? You can use the typical email I send out as a template. Then I will just recognize the email with an email back to you.

Thanks,
Trey

From: Martin, Melissa M -FS
Sent: Monday, June 19, 2017 9:38 AM
To: Upton, Carolyn -FS <cupton@fs.fed.us>; Schillie, Trey C -FS <tschillie@fs.fed.us>
Cc: Martin, Melissa M -FS <mmmartin@fs.fed.us>; Jaeger, Dennis -FS <djaeger01@fs.fed.us>
Subject: LaVA Roadless Approval

Good morning. On Tuesday, June 13, 2017, we received verbal approval from the Regional Office regarding the pre-scoping roadless package for our LaVA project. I would appreciate it if I could have something in writing for my project record. Thank you. ~Melissa

Melissa Martin
Planning and Information Program Manager

Forest Service
Medicine Bow-Routt National Forests & Thunder Basin National Grassland

p: 307-745-2371
f: 307-745-2467
mmmartin@fs.fed.us

2468 Jackson Street
Laramie, WY 82070
www.fs.fed.us

Caring for the land and serving people

From:	Martin, Melissa M -FS
To:	Martin, Melissa M -FS
Subject:	LaVA RO Roadless Approval - FEIS
Date:	Monday, December 10, 2018 1:26:03 PM
Attachments:	image001.png image002.png image003.png image004.png

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From: Wehrli, Christopher L -FS
Sent: Friday, December 7, 2018 4:07 PM
To: Martin, Melissa M -FS <mmmartin@fs.fed.us>; Sloan, Jenna - FS <jennasloan@fs.fed.us>
Cc: Loomis, David E -FS <dloomis@fs.fed.us>; Westfahl, Mark -FS <mwestfahl@fs.fed.us>; Schroyer, Karen -FS <kschroyer@fs.fed.us>; Bacon, Russell M -FS <rmbacon@fs.fed.us>; Armbruster, Jason M -FS <jasonmarmbruster@fs.fed.us>; Romero, Frank E -FS <feromero@fs.fed.us>; Wehrli, Christopher L -FS <clwehrli@fs.fed.us>
Subject: RE: Medicine Bow LaVA Project - Regional Review Requested - High Profile and Roadless

Russ,

I had the opportunity to brief Deputy Regional Forester Buchanan on the Medicine Bow LaVA project that you recently submitted for roadless review. The DRF reviewed the roadless briefing papers in the context of the 2012 Colorado Roadless Rule and found it consistent.

The project does not involve road construction, road reconstruction in IRAs. Tree-cutting in IRAs would be consistent with exceptions identified in the 2001 RACR.

The project is approved for draft decision.

Please let me know if you have any questions.

Christopher

Christopher Wehrli
Environmental Coordinator –
Administrative Review Coordinator, FOIA
Program Manager, Roadless Coordination
Forest Service
Rocky Mountain Regional Office
p: 303-275-5108
c: 435-201-9523
christopher.wehrli@usda.gov

1617 Cole Blvd
Building 17
Lakewood, CO 80401

Caring for the land and serving people

From: Martin, Melissa M -FS
Sent: Monday, November 26, 2018 12:33 PM
To: Sloan, Jenna - FS <jennasloan@fs.fed.us>
Cc: Loomis, David E -FS <dloomis@fs.fed.us>; Wehrli, Christopher L -FS <clwehrli@fs.fed.us>; Westfahl, Mark -FS <mwestfahl@fs.fed.us>; Schroyer, Karen -FS <kschroyer@fs.fed.us>; Bacon, Russell M -FS <rmbacon@fs.fed.us>; Armbruster, Jason M -FS <jasonmarmbruster@fs.fed.us>; Romero, Frank E -FS <feromero@fs.fed.us>; Martin, Melissa M -FS <mmmartin@fs.fed.us>
Subject: Medicine Bow LaVA Project - Regional Review Requested - High Profile and Roadless
Importance: High

Good afternoon Jenna. I would appreciate it if you could initiate the necessary 'high profile project/roadless' Regional review process for our Medicine Bow Landscape Vegetation Analysis (LaVA) Project. We are hoping to release our Final EIS and draft ROD on January 18 but need both WO and RO approval before doing so.

In anticipation of the review, I am attaching the following documents:

Notice of Availability Package:
Briefing Paper;
Executive Summary;
Clearance Sheet

Roadless Review Package:
Pre-decisional roadless review form;
Roadless Table – Attachment A;
25 Individual Roadless Maps – Attachment B;
Comprehensive Roadless Map depicting proposals – Attachment C

I believe that Russ will be interacting with Jacque a fair amount over the next couple of weeks and will discuss the project, but I also believe that other Regional Directors need to be involved in the review process. Thank you for your help with this. ~Melissa

Melissa M. Martin
Planning & Information Program Manager

Forest Service
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Caring for the land and serving people

WORKSHEET – Roadless Area Characteristics
Evaluating the Effects of Project Activities on Roadless Area Characteristics

Date:	
Forest/District:	
Roadless Area:	

Description of Project Activity or Impact to Roadless Area:
(Describe the activity that is affecting the roadless area, i.e. miles of road construction, timber acres harvested, acres treated by fire, etc…)

Potential Effects to Roadless Area Characteristics

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
1- High quality or undisturbed soil, water or air resources These three key resources are the foundation upon which other resource values and outputs depend. Healthy watersheds provide clean water for domestic, agricultural, and industrial uses; help maintain abundant and healthy fish and wildlife populations; and are the basis for many forms of outdoor recreation.			*Identify any unique or critical watershed resources.* *Describe whether or not there are unique or critical watershed resources in the roadless area as a whole and in the portion that would be affected, or if the area is not unique.* *Describe how the project will affect these key resources areas and the habitats that depend on them.*
2 - Sources of public drinking water National forests contain watersheds that are important sources of public drinking water. Careful management of these watersheds is crucial in maintaining the flow of clean water to a growing population.			*Identify any public drinking water systems or sources within the project area or that would be affected by the project.* *Address public drinking water by describing the existing sources of public drinking water in the roadless area as a whole and in the portion that would be affected.* *Describe how the project would affect water quality and quantity of the public drinking water source.*
3 - Diversity of plant and animal communities. Roadless areas are more likely than roaded areas to support greater ecosystem health, including a diversity of native and desired non-native plant and animal communities, due to the absence of disturbances caused by roads and accompanying activities. Roadless areas also may conserve native biodiversity by serving as a bulwark against the spread of nonnative invasive species.			*Identify any unique plant and animal communities within the roadless area and in the portion that may be affected.* *Describe effects to the diversity of plant and animal communities.*

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
4 - Habitat for TES and species dependent on large undisturbed areas of land Roadless areas function as biological strongholds and refuges for many species, including terrestrial and aquatic plant and animal species. Many of the nation's species currently listed as threatened, endangered, or proposed for listing under the Endangered Species Act, and those listed by the Forest Service as sensitive, might have habitat within roadless areas.			*Identify any TES or sensitive species within the Roadless area and portion of the roadless area to be affected. Are they unique to this area?* *Describe how the project would affect the habitats or populations and whether this effect is significant across the normal range and distribution of these habitats and populations.*
5 - Primitive and semi-primitive classes of recreation These types of dispersed recreation often occur in roadless areas, providing opportunities for hiking, camping, wildlife viewing, hunting, fishing, and cross-country skiing. Although roadless areas with these recreation opportunities could have many wilderness-like attributes, they often allow the use of mountain bikes and other mechanized and motorized means of travel, in contrast to designated wilderness areas. Primitive, semi-primitive non-motorized, and semi-primitive motorized areas can also take pressure off heavily used wilderness areas by providing additional solitude and quiet, and dispersed recreation opportunities.			Describe current recreation opportunities within the Roadless area and the portion to be affected. Identify the effects of your project of the area and these activities. Describe the effect in terms of availability for similar experiences in surrounding areas or within the region of use. Consider link to ROS mapping.
6 - Reference landscapes for research study or interpretation The body of knowledge about the effects of management activities over long periods of time and on large landscapes is very limited. Reference landscapes can provide comparison areas for evaluation and monitoring. These areas provide a natural setting that may be useful as a comparison to study the effects of more intensely managed areas.			Describe the landscape that is present. Describe any **unique** reference landscapes that exist within the Roadless area and the portion to be affected. Describe how the project activities might affect the reference landscape values of the Roadless area. Consider how the landscapes within the Inventoried Roadless area fits within the broader landscape and if the project creates any overall change. Consider landscape character descriptions in SMS.

Roadless Characteristics **From either the 2001 Roadless Rule (36 CFR 294 Subpart B) or Colorado Roadless Rule (36 CFR 294 Subpart D)**	**Is there an effect?** **Yes or No**	**Which direction is the effect?** **Improving, Stable, or Downward Trend?**	**Describe the actual effect.** Use descriptive terms that discuss the effect, not the activity. Explain if the proposal would Alter or Modify the landscape.
7 - Landscape character and integrity High quality scenery, especially scenery with natural-appearing landscapes, is a primary reason that people choose to recreate in or around an area. Quality scenery contributes directly to real estate values in neighboring communities and residential areas.			*Describe the current scenic quality and character of the area (roadless area as a whole, and in portion that would be affected.* *Describe project effects to the scenic integrity of the area and changes to the character of the area. Consider existing scenic integrity.*
8 - Traditional cultural properties and sacred sites Roadless areas may contain traditional cultural properties and sacred sites. Traditional cultural properties are places, sites, structures, districts, or objects that are historically significant in the beliefs, customs, and practices of a community. Sacred sites are places that are determined sacred by virtue of their established religious significance to or ceremonial use by a Native American religion. Federal agencies are to accommodate access to and ceremonial use of Native American sacred sites by Native American religious practitioners, and are to avoid adversely affecting traditional cultural properties and sacred sites, when practicable.			*Identify generically any significant cultural resources within the Roadless area and portion that could be affected.* *Describe the effect of the project on these resources. Typically mitigation will be designed to prevent significant effects to these resources.*
9 - Other locally unique characteristics Roadless areas can offer unique characteristics that are not covered by the other categories. Examples include uncommon geological formations, which are valued for their scientific and scenic qualities, or unique wetland complexes. Unique social, cultural, or historical characteristics could depend on the roadless character of the landscape. Examples include places for local events, areas prized for collection of non-timber forest products, or exceptional hunting and fishing opportunities.			*Identify any locally **unique** characteristics Roadless area and portion that could be affected.* *Describe how the project would affect these values.*

Summary	Will the project maintain or improve roadless area characteristics?	No	Yes	Summarize the findings
	Short term?			
	Long term?			

Roadless Project Evaluation Form

U.S. Forest Service – Rocky Mountain Region

Date Submitted:

Forest and District	
Project Name	
Roadless Area(s)	
NEPA Doc type (CE/EA/EIS?)	

Resource type *(veg, recreation, wildlife habitat, etc)*	**Project Stage (pre-scoping, or pre- DRAFT decision)**	**Road Construction or Reconstruction (est. miles)**	**Tree Cutting (est. acres)**	**Linear Construction Zone (est. miles CO only)**	**Is this project within the "upper tier?" (CO only)**

1. **Describe the project. Provide a brief summary, location, including the purpose and need, and proposed action. Please include a map (.pdf maps work best for printing):**

2. **How this is consistent with the 2001 Rule, or the Colorado Roadless Rule?** *If the project involves tree-cutting, road construction, road reconstruction, or construction of a linear construction zone (Colorado only), it must meet an exception.*

3. **Does your analysis include impacts to the nine (9) roadless area characteristics?**

4. **Briefly describe any State coordination or cooperation for this project (Colorado only)?**

5. **Briefly describe consultation with Tribal governments completed for this project.**

6. **Describe outreach and analysis completed to determine if project could potentially impact any protect groups (civil rights), including but not limited to, women, minorities, or people with disabilities.**

7. **Deciding Official:**

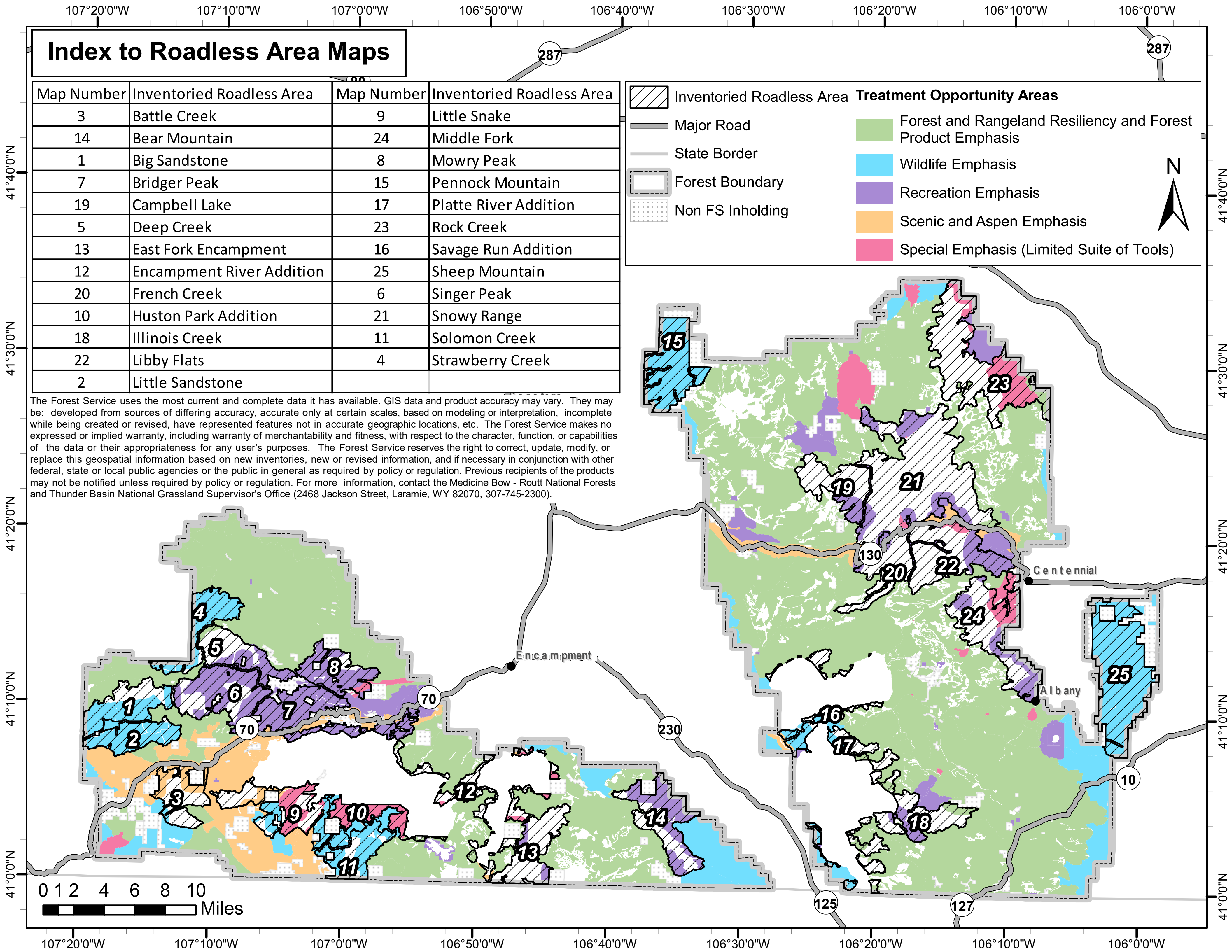
8. **Contact for the project:**

R2 SharePoint Link

Index to Roadless Area Maps

Map Number	Inventoried Roadless Area	Map Number	Inventoried Roadless Area
3	Battle Creek	9	Little Snake
14	Bear Mountain	24	Middle Fork
1	Big Sandstone	8	Mowry Peak
7	Bridger Peak	15	Pennock Mountain
19	Campbell Lake	17	Platte River Addition
5	Deep Creek	23	Rock Creek
13	East Fork Encampment	16	Savage Run Addition
12	Encampment River Addition	25	Sheep Mountain
20	French Creek	6	Singer Peak
10	Huston Park Addition	21	Snowy Range
18	Illinois Creek	11	Solomon Creek
22	Libby Flats	4	Strawberry Creek
2	Little Sandstone		

The Forest Service uses the most current and complete data it has available. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, have represented features not in accurate geographic locations, etc. The Forest Service makes no expressed or implied warranty, including warranty of merchantability and fitness, with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes. The Forest Service reserves the right to correct, update, modify, or replace this geospatial information based on new inventories, new or revised information, and if necessary in conjunction with other federal, state or local public agencies or the public in general as required by policy or regulation. Previous recipients of the products may not be notified unless required by policy or regulation. For more information, contact the Medicine Bow - Routt National Forests and Thunder Basin National Grassland Supervisor's Office (2468 Jackson Street, Laramie, WY 82070, 307-745-2300).

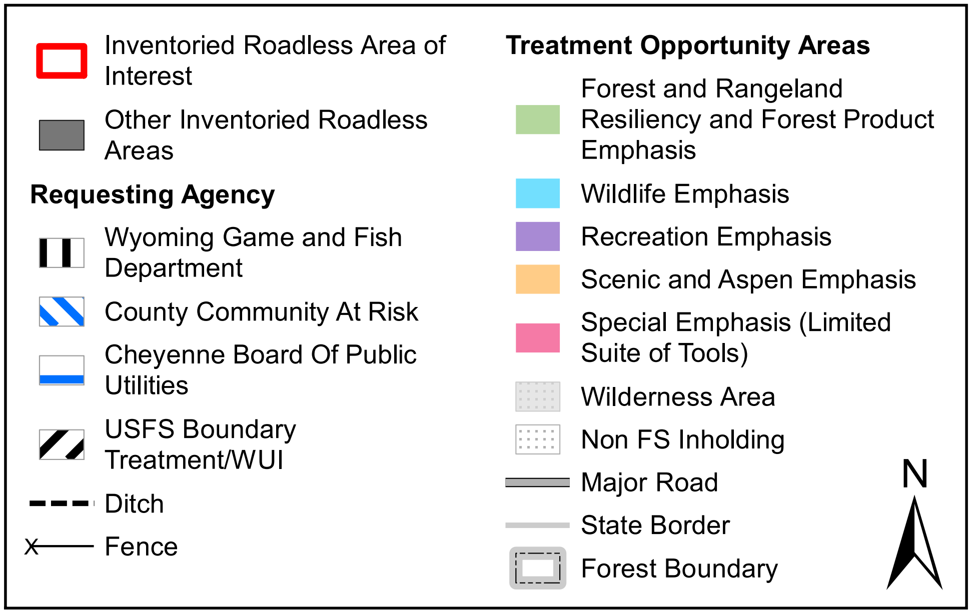


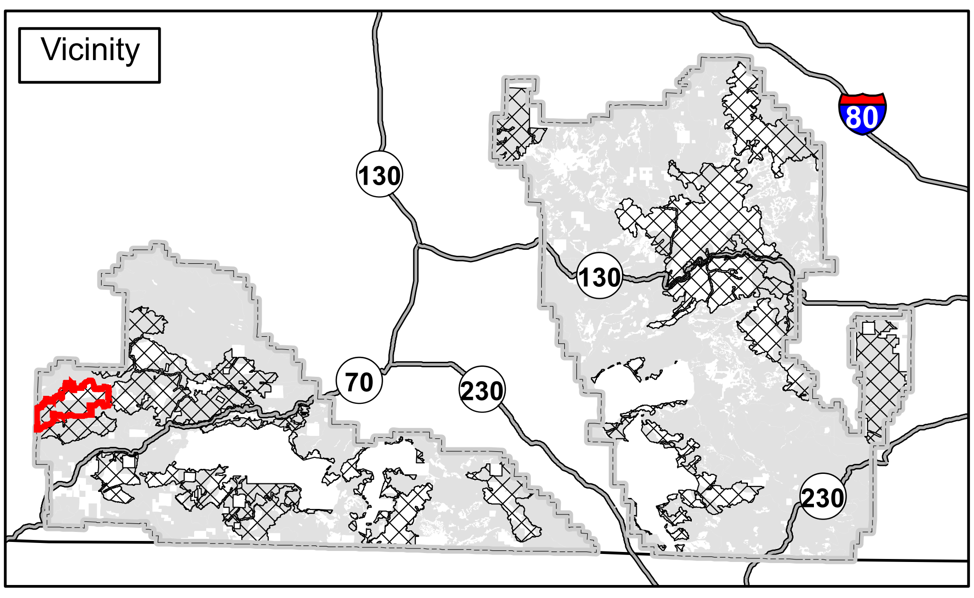
1: Big Sandstone Roadless Area

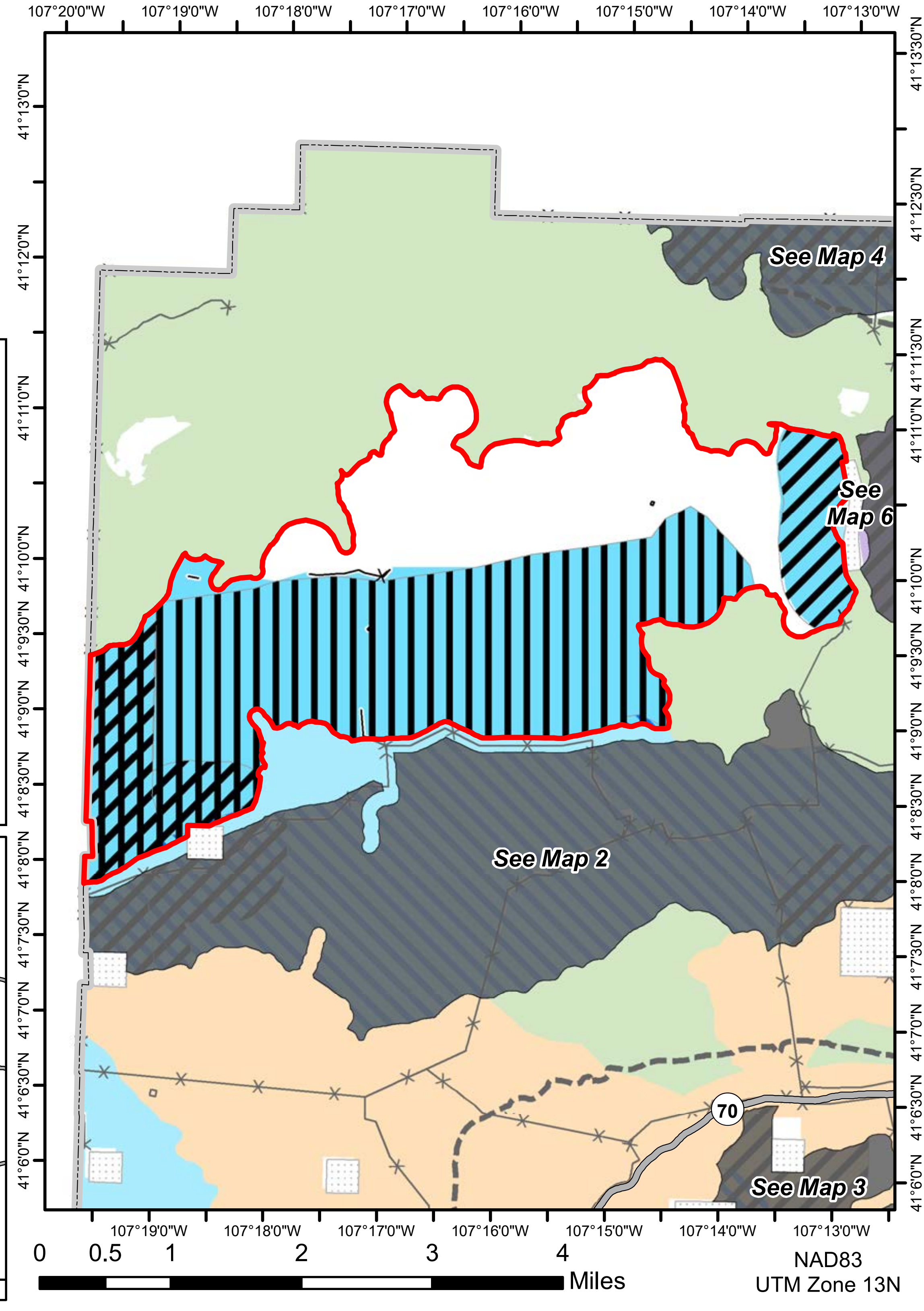
Total Roadless Area Acres: 7,170

Acres in Treatment Opportunity Areas: 4,793

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department





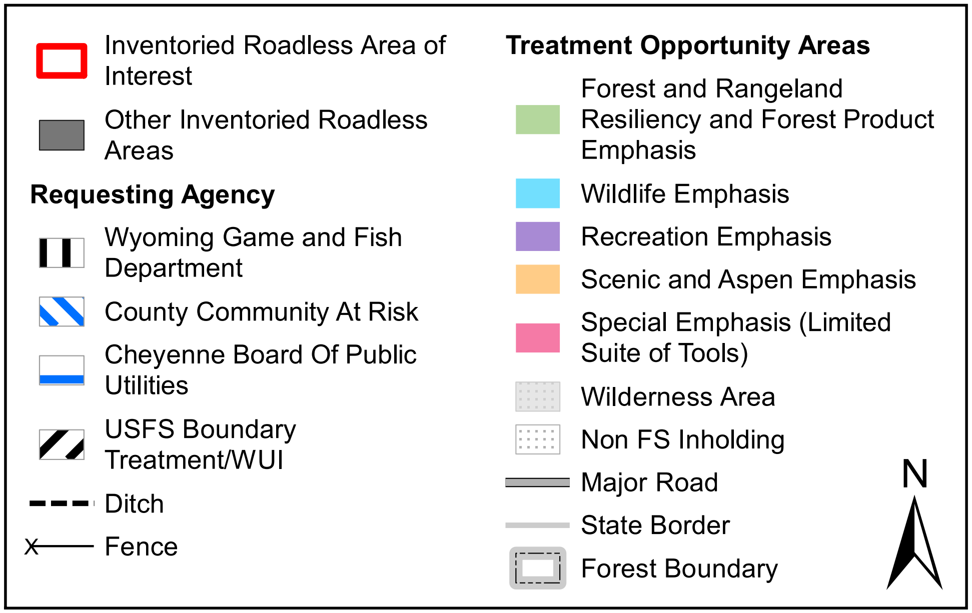


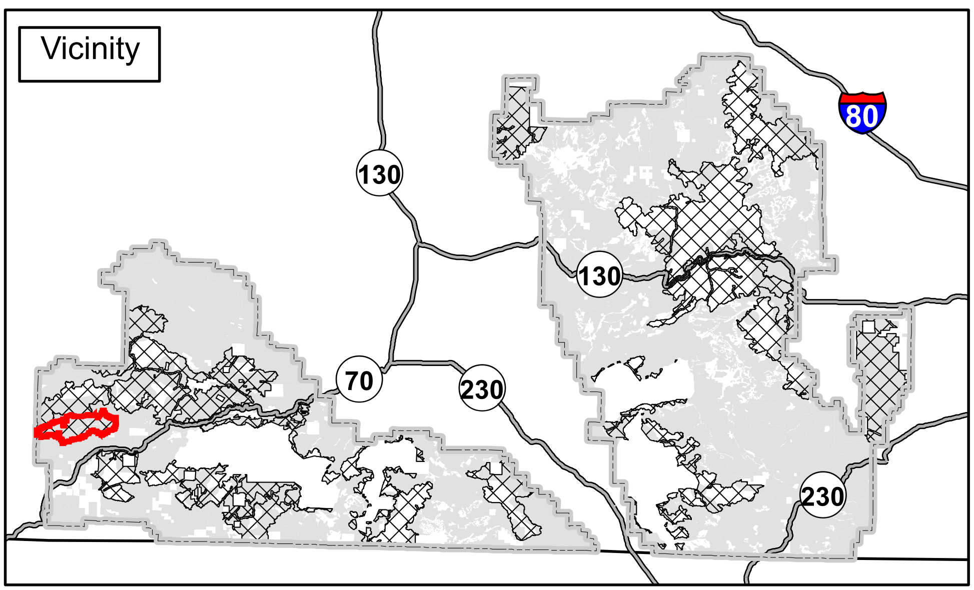
2: Little Sandstone Roadless Area

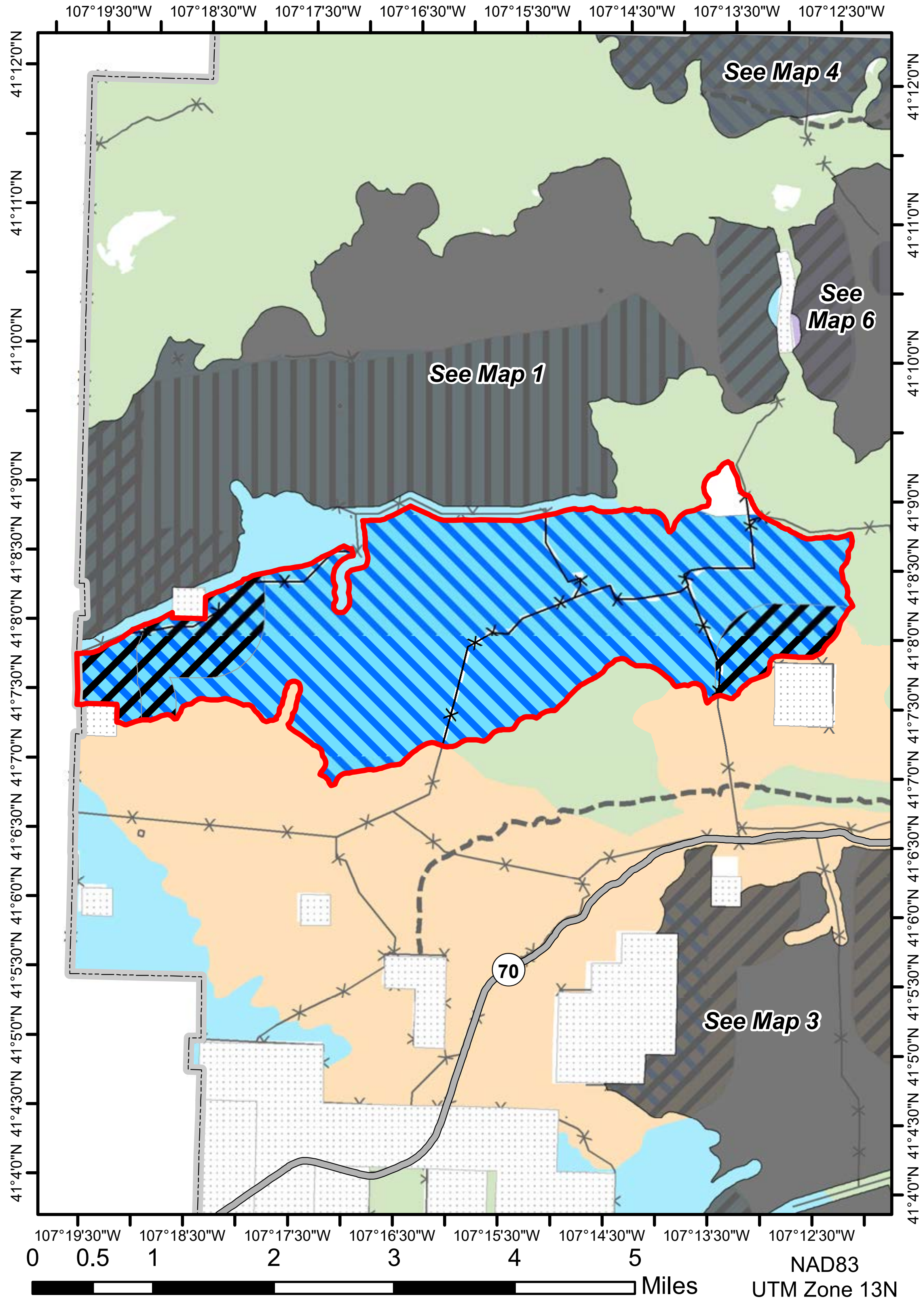
Total Roadless Area Acres: 5,481

Acres in Treatment Opportunity Areas: 5,207

Treatment Requests: County Community at Risk, Forest Service WUI







3: Battle Creek Roadless Area

Total Roadless Area Acres: 5,894

Acres in Treatment Opportunity Areas: 2,228

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

Wildlife Emphasis

Recreation Emphasis

Scenic and Aspen Emphasis

Special Emphasis (Limited Suite of Tools)

Wilderness Area

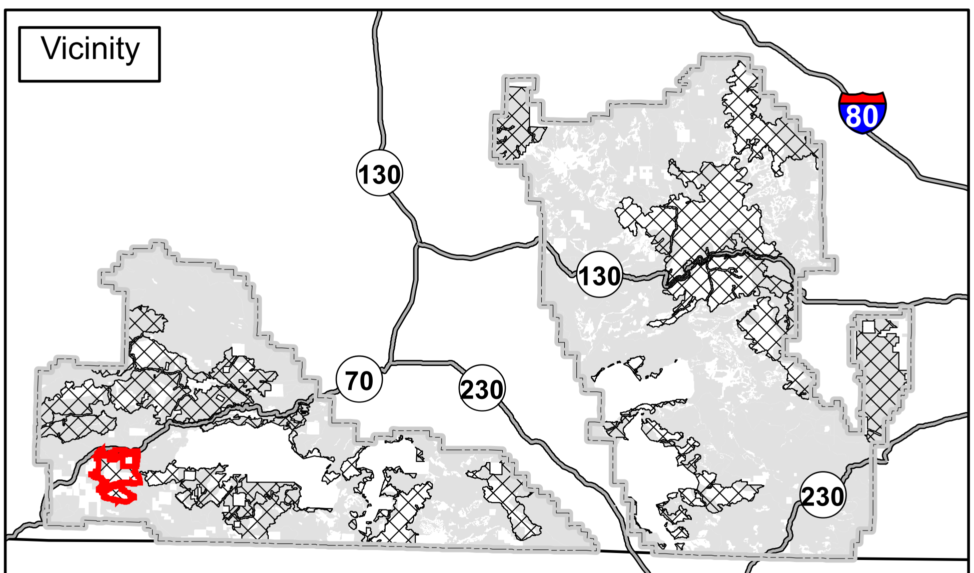
Non FS Inholding

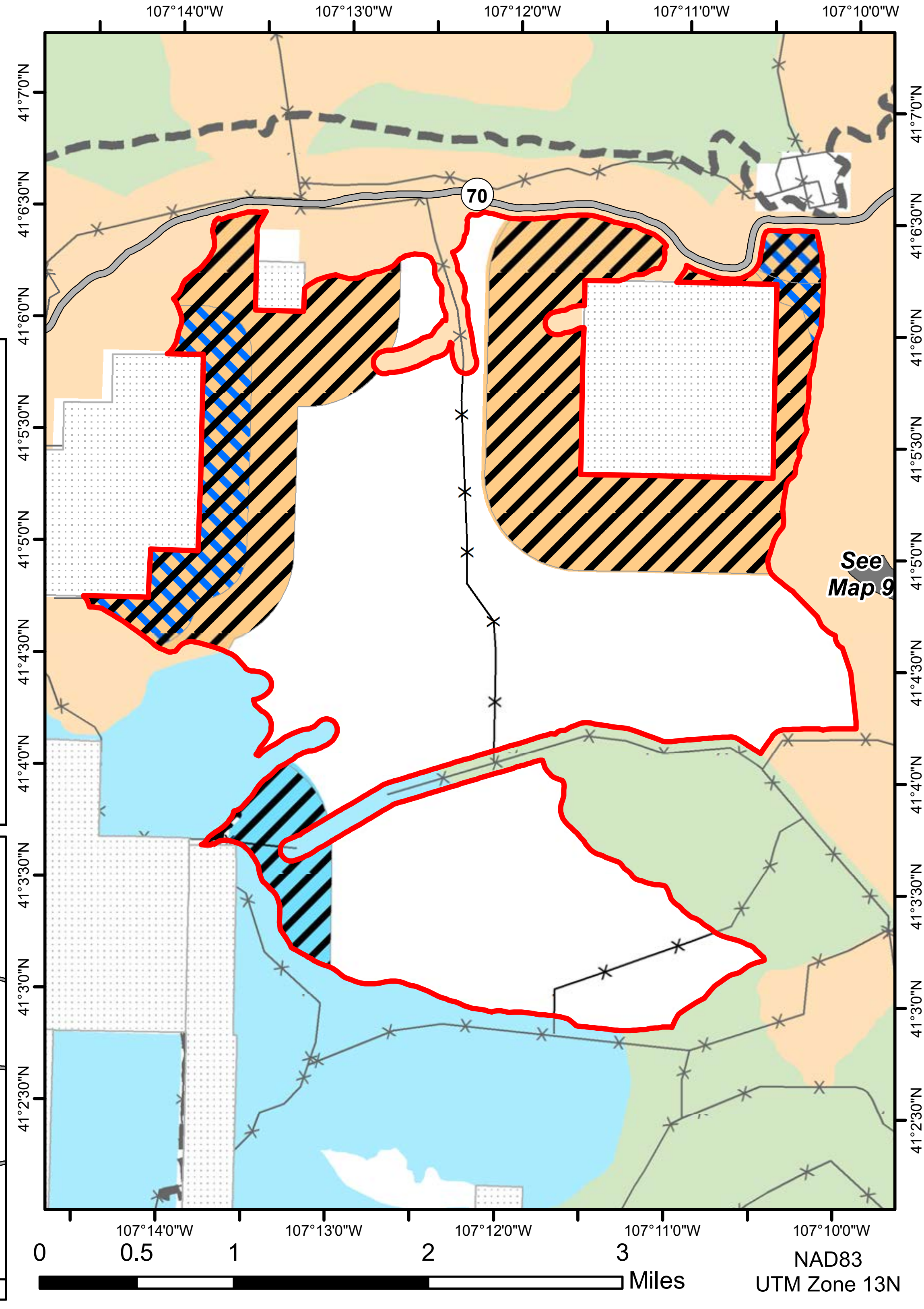
Major Road

State Border

Forest Boundary

N





4: Strawberry Creek Roadless Area

Total Roadless Area Acres: 5,876

Acres in Treatment Opportunity Areas: 5,616

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

Wildlife Emphasis

Recreation Emphasis

Scenic and Aspen Emphasis

Special Emphasis (Limited Suite of Tools)

Wilderness Area

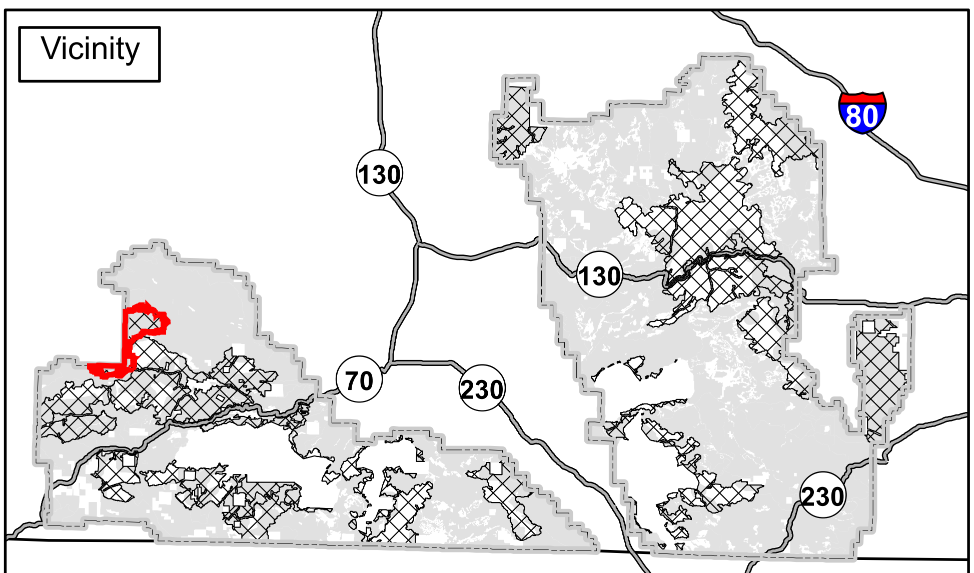
Non FS Inholding

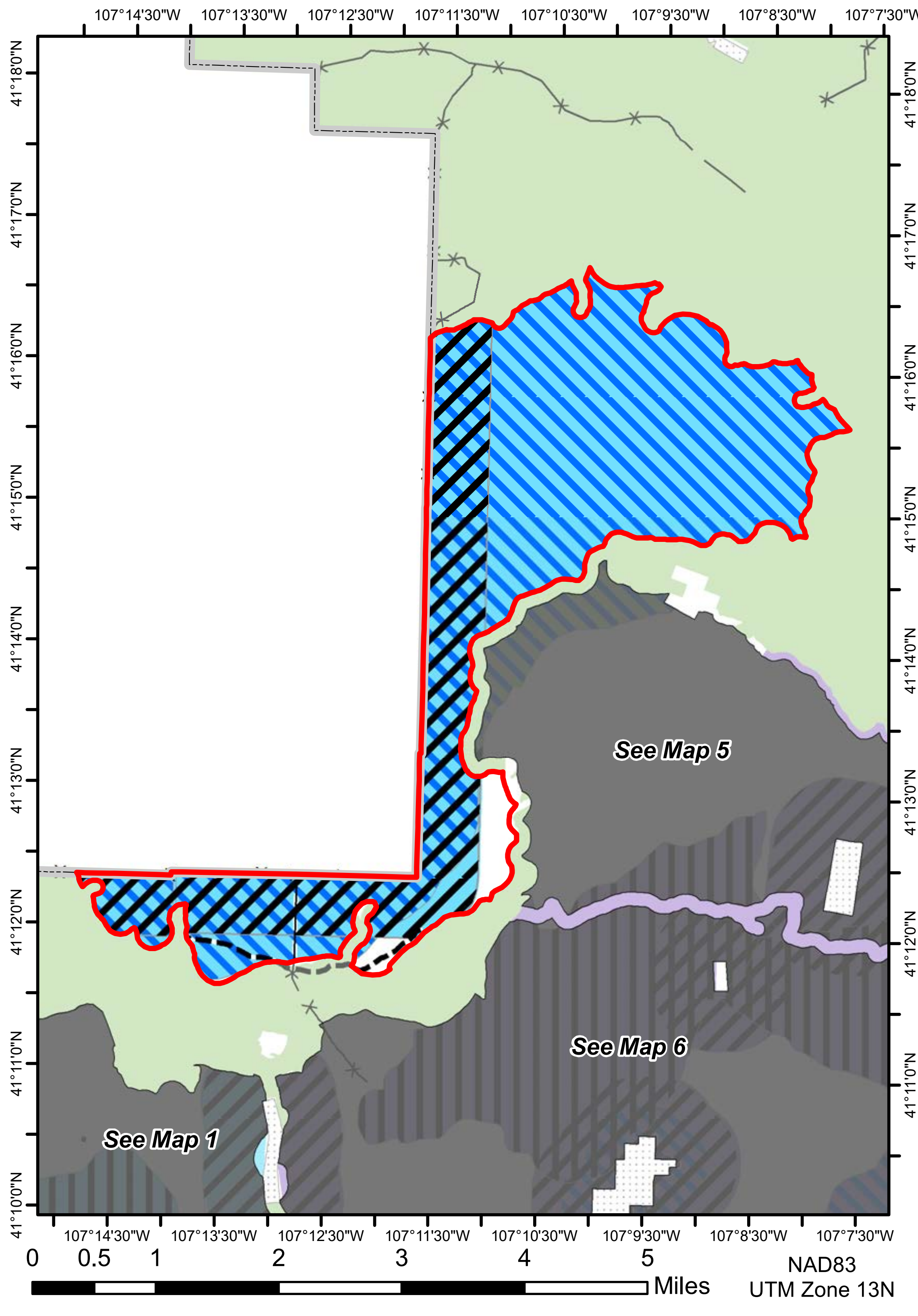
Major Road

State Border

Forest Boundary

N



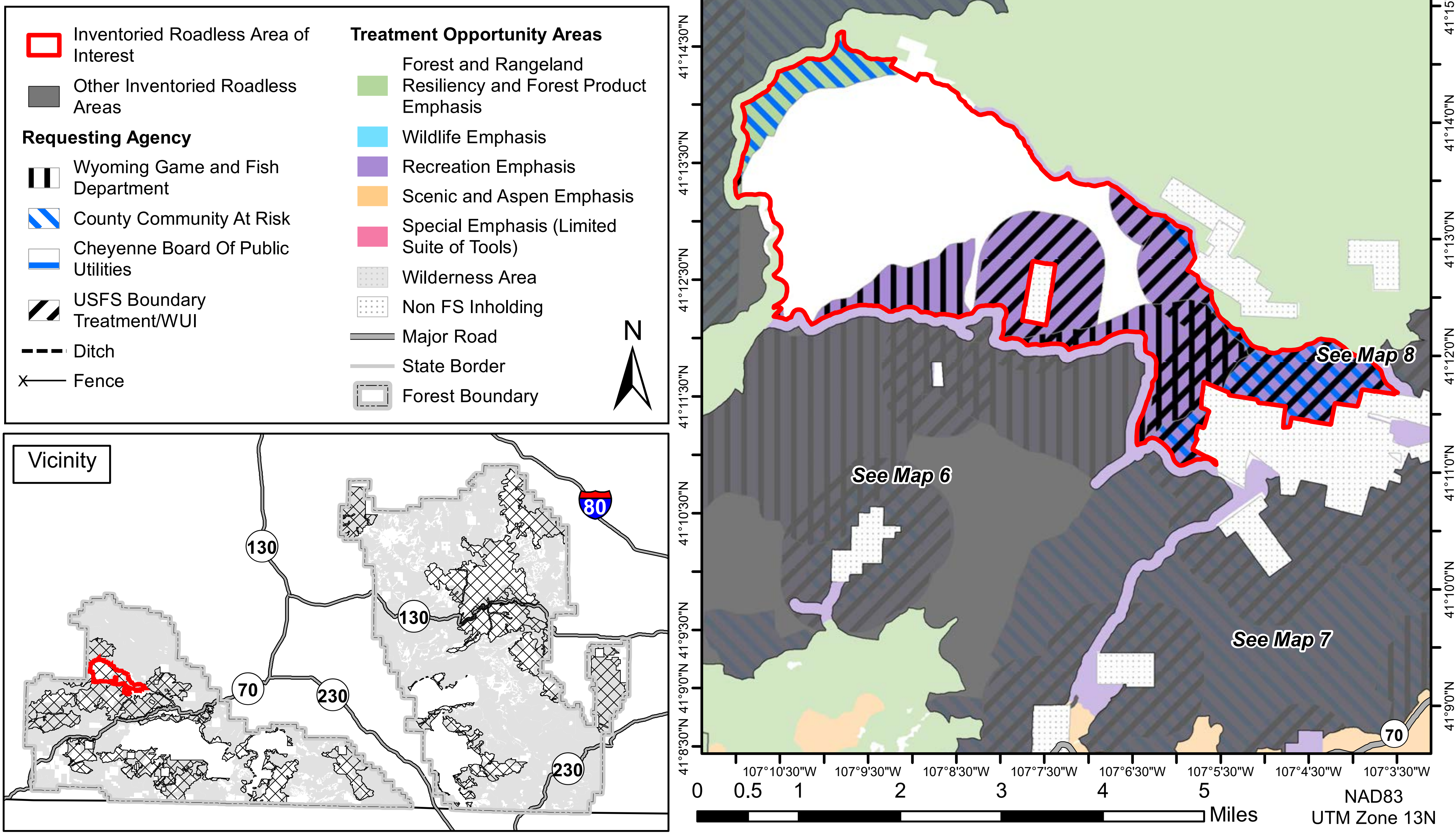


5: Deep Creek Roadless Area

Total Roadless Area Acres: 6,411

Acres in Treatment Opportunity Areas: 3,156

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department



6: Singer Peak Roadless Area

Total Roadless Area Acres: 10,491

Acres in Treatment Opportunity Areas: 7,308

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

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Special Emphasis (Limited Suite of Tools)

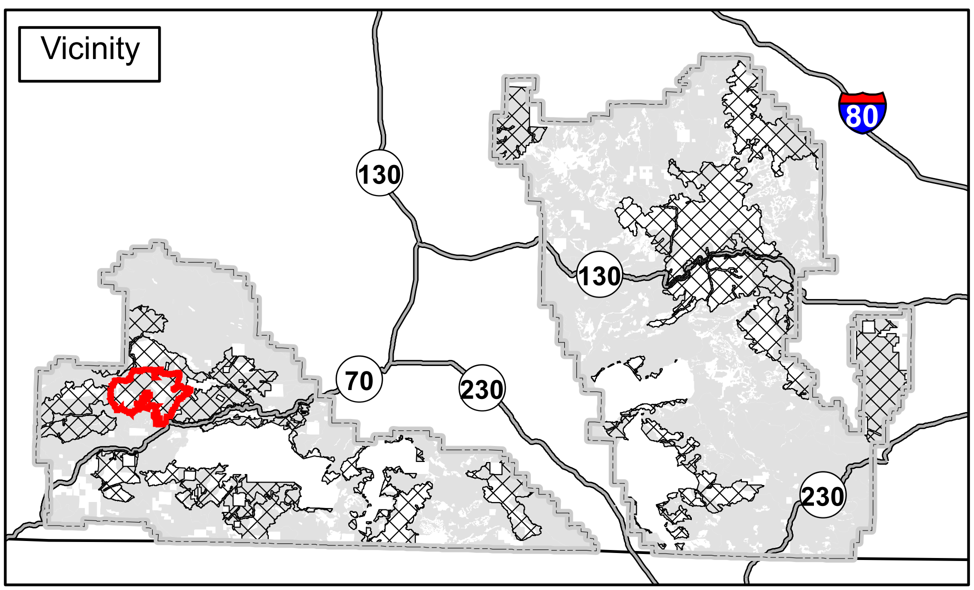
Wilderness Area

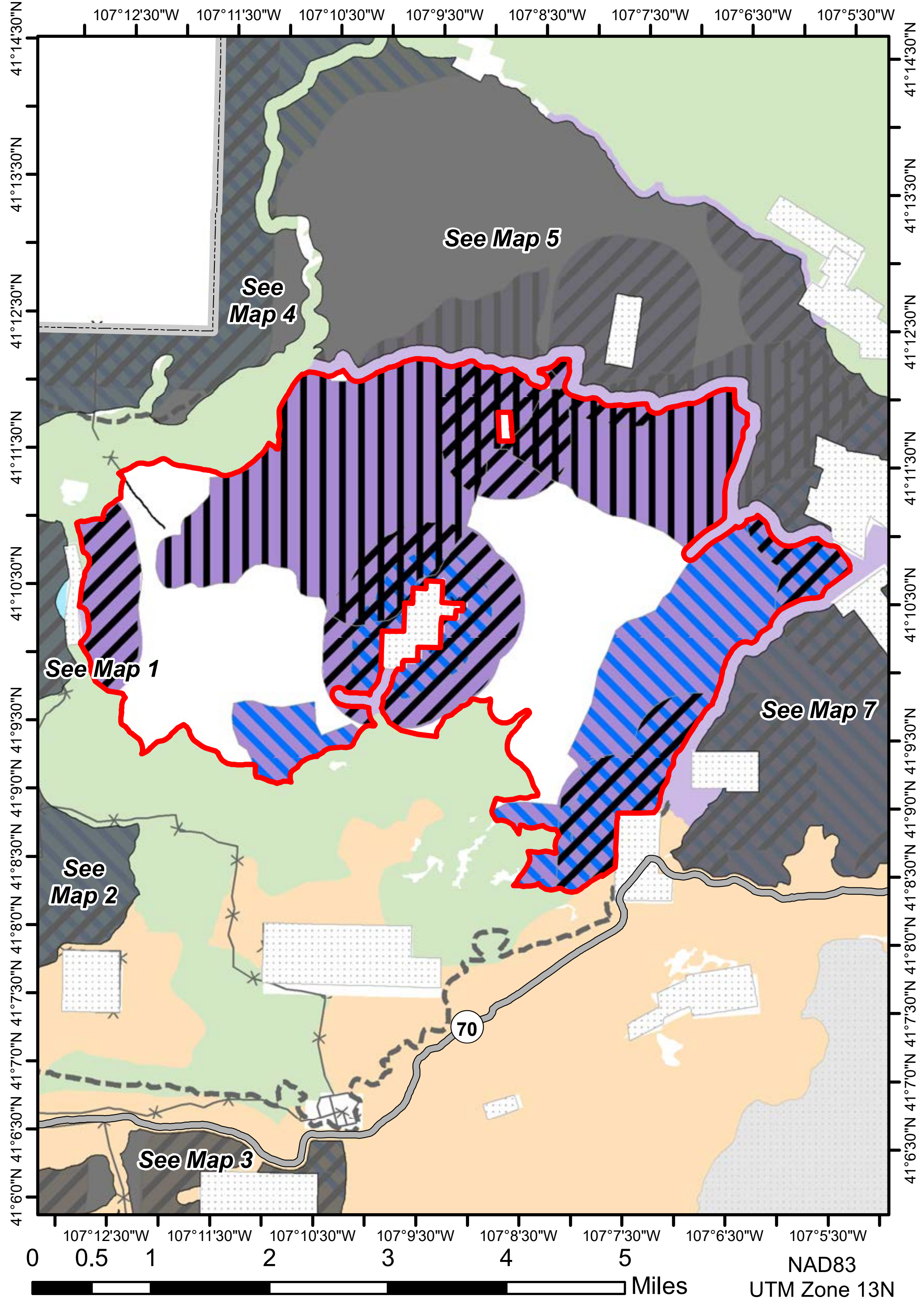
Non FS Inholding

Major Road

State Border

Forest Boundary





7: Bridger Peak Roadless Area

Total Roadless Area Acres: 6,694

Acres in Treatment Opportunity Areas: 6,629

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

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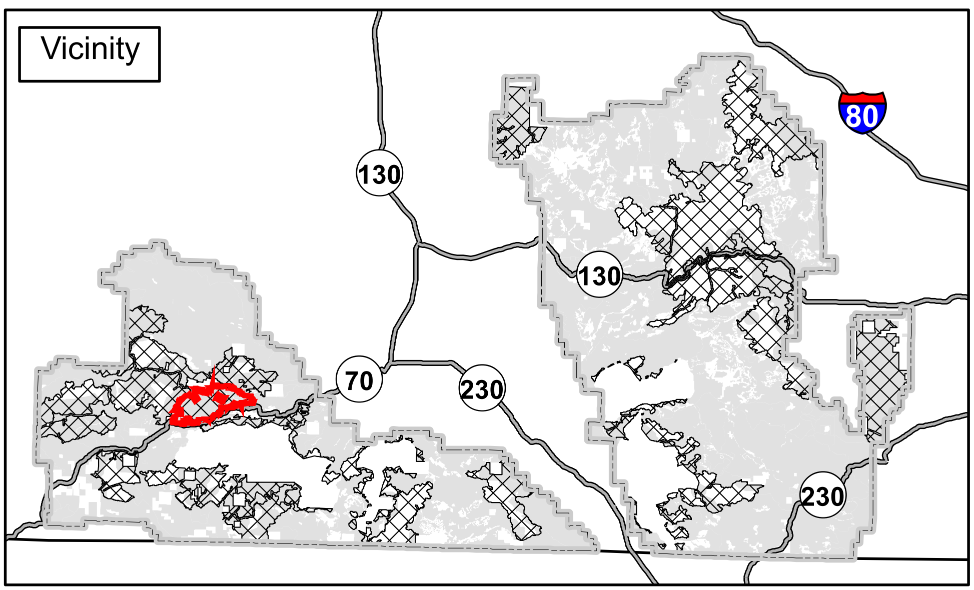
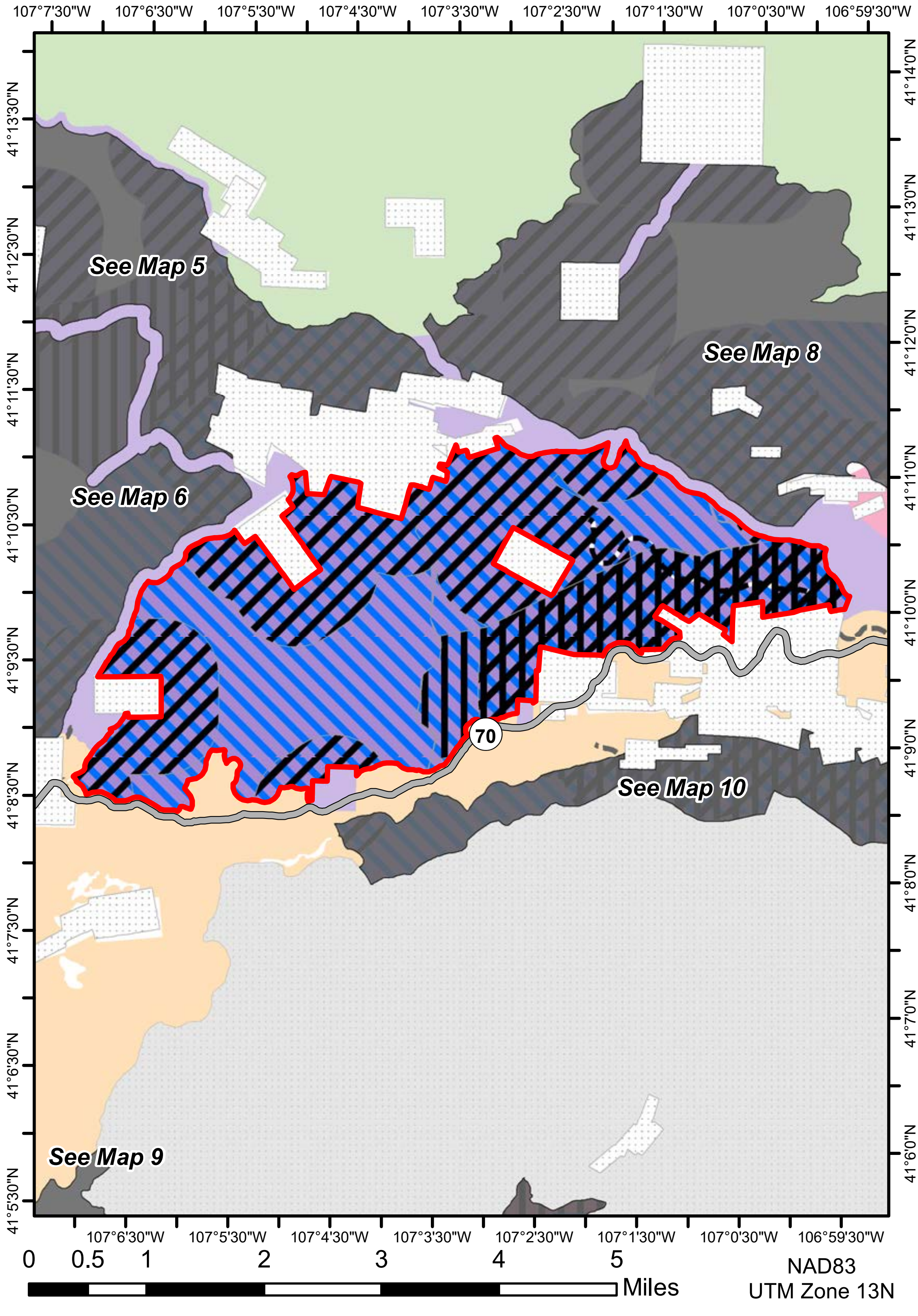
Non FS Inholding

Major Road

State Border

Forest Boundary





8: Mowry Peak Roadless Area

Total Roadless Area Acres: 6,241

Acres in Treatment Opportunity Areas: 5,141

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

Wildlife Emphasis

Recreation Emphasis

Scenic and Aspen Emphasis

Special Emphasis (Limited Suite of Tools)

Wilderness Area

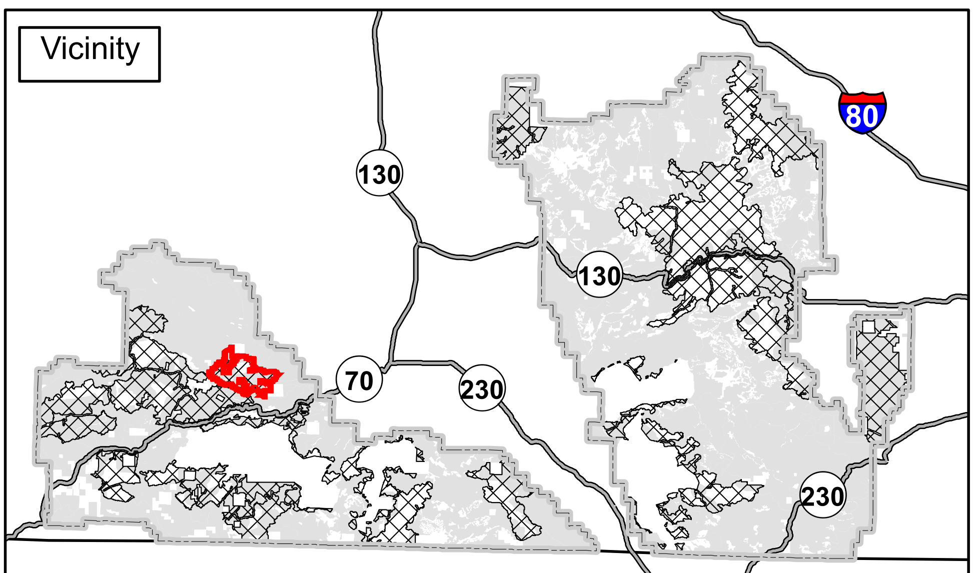
Non FS Inholding

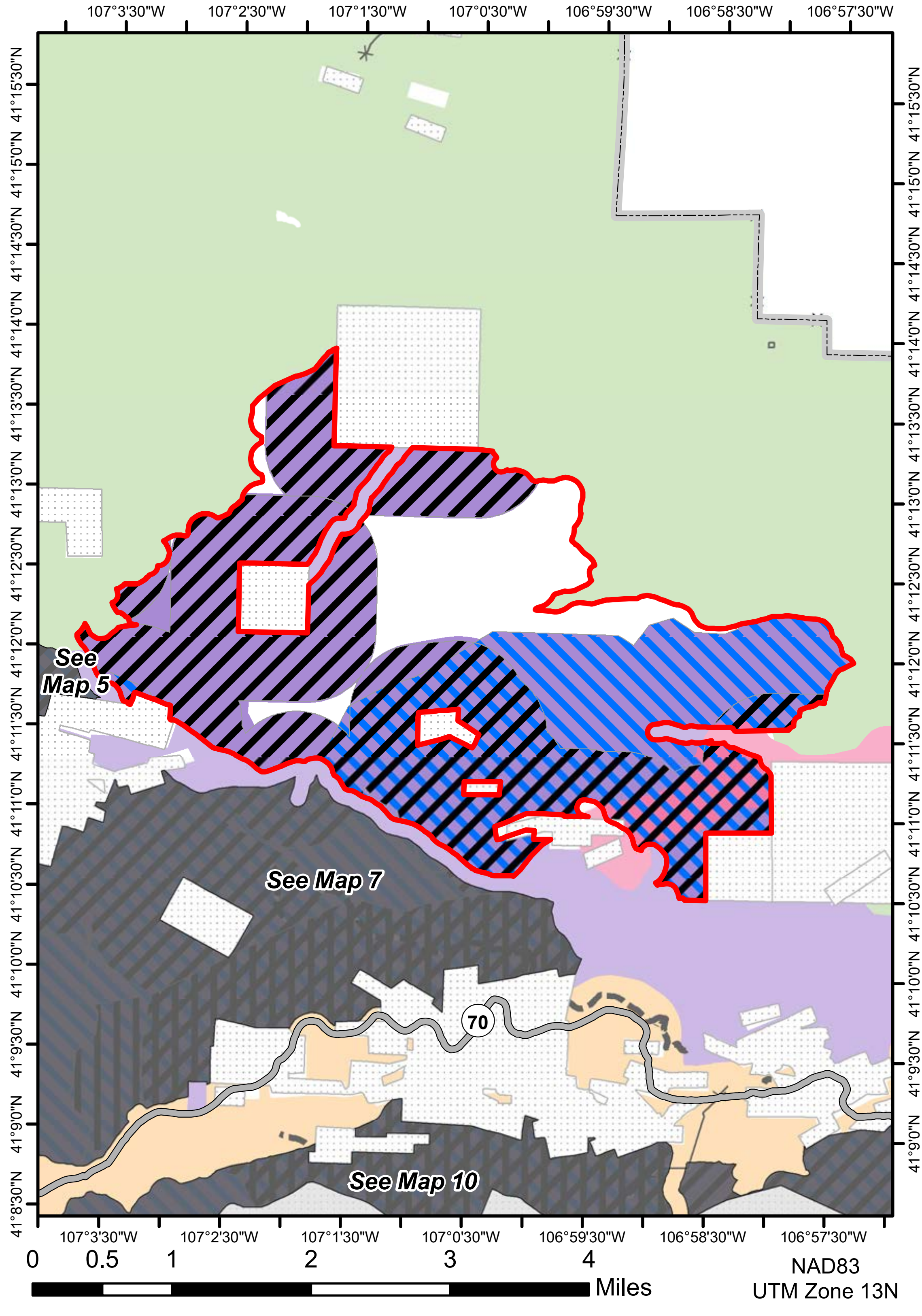
Major Road

State Border

Forest Boundary

N





9: Little Snake Roadless Area

Total Roadless Area Acres: 9,920

Acres in Treatment Opportunity Areas: 6,249

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department, Cheyenne Board of Public Utilities

Inventoried Roadless Area of Interest
Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department
County Community At Risk
Cheyenne Board Of Public Utilities
USFS Boundary Treatment/WUI
Ditch
Fence

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Forest and Rangeland Resiliency and Forest Product Emphasis
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Major Road
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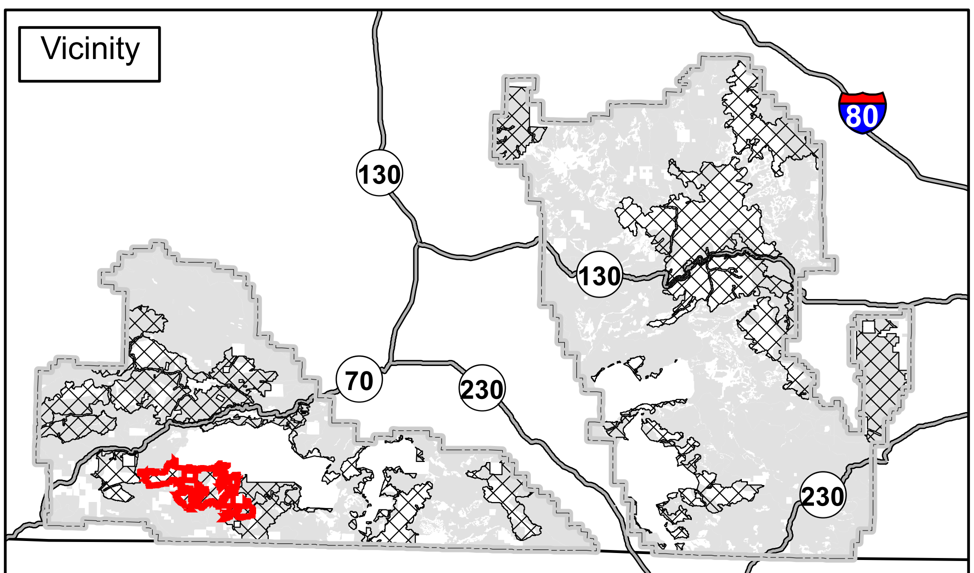

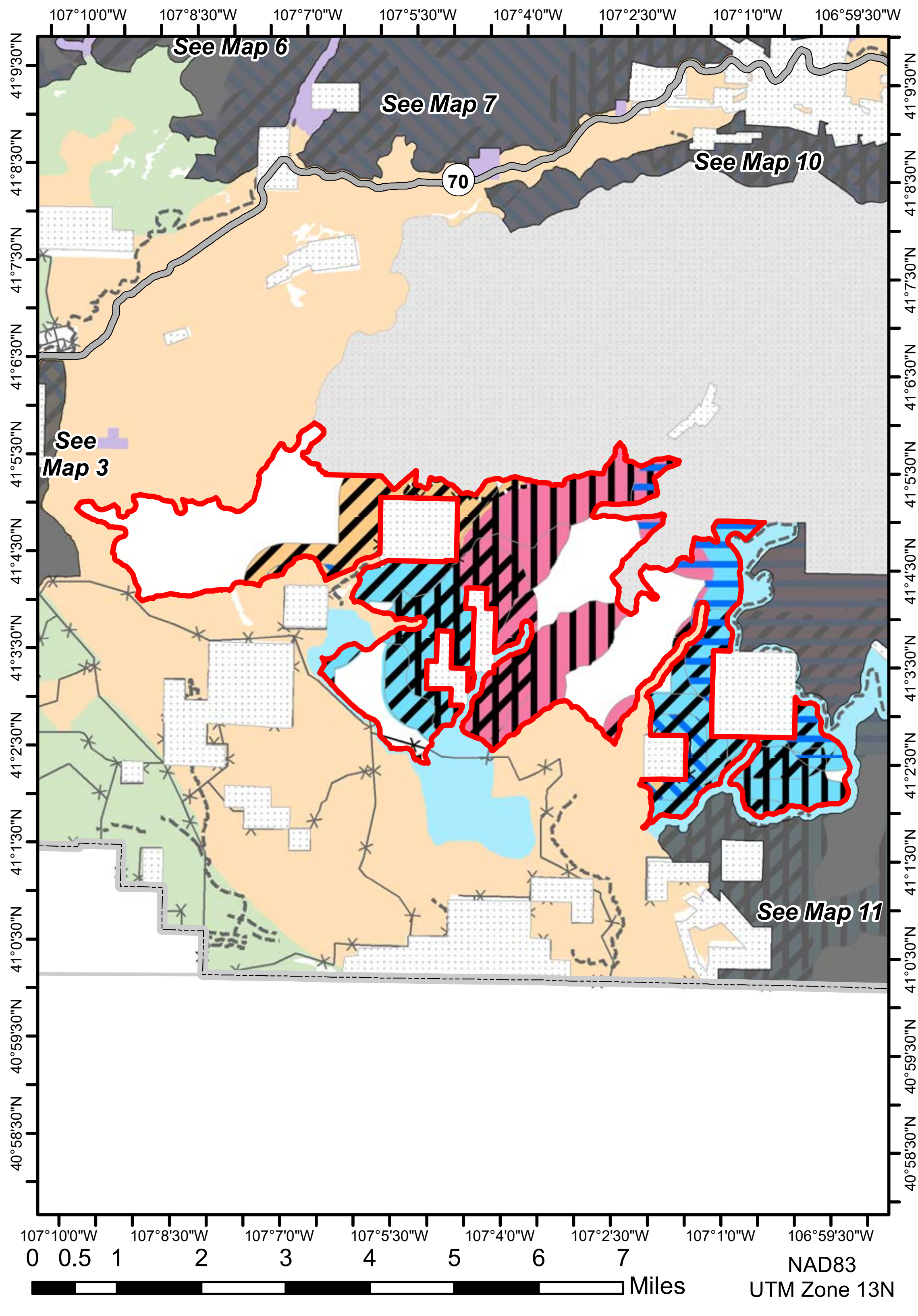

10: Huston Park Addition Roadless Area

Total Roadless Area Acres: 8,400

Acres in Treatment Opportunity Areas: 7,138

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department, Cheyenne Board of Public Utilities

- Inventoried Roadless Area of Interest
- Other Inventoried Roadless Areas

Requesting Agency

- Wyoming Game and Fish Department
- County Community At Risk
- Cheyenne Board Of Public Utilities
- USFS Boundary Treatment/WUI
- Ditch
- Fence

Treatment Opportunity Areas

- Forest and Rangeland Resiliency and Forest Product Emphasis
- Wildlife Emphasis
- Recreation Emphasis
- Scenic and Aspen Emphasis
- Special Emphasis (Limited Suite of Tools)
- Wilderness Area
- Non FS Inholding
- Major Road
- State Border
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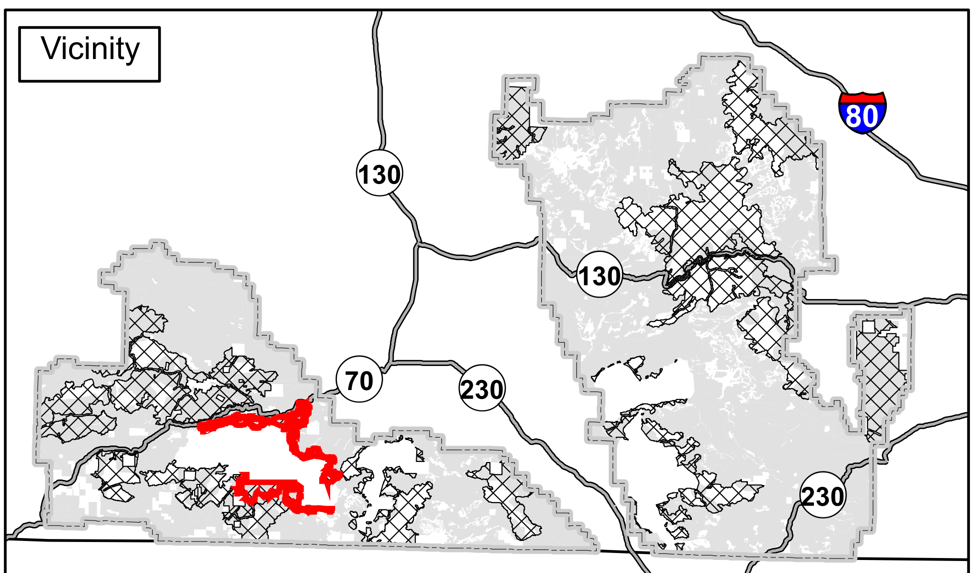

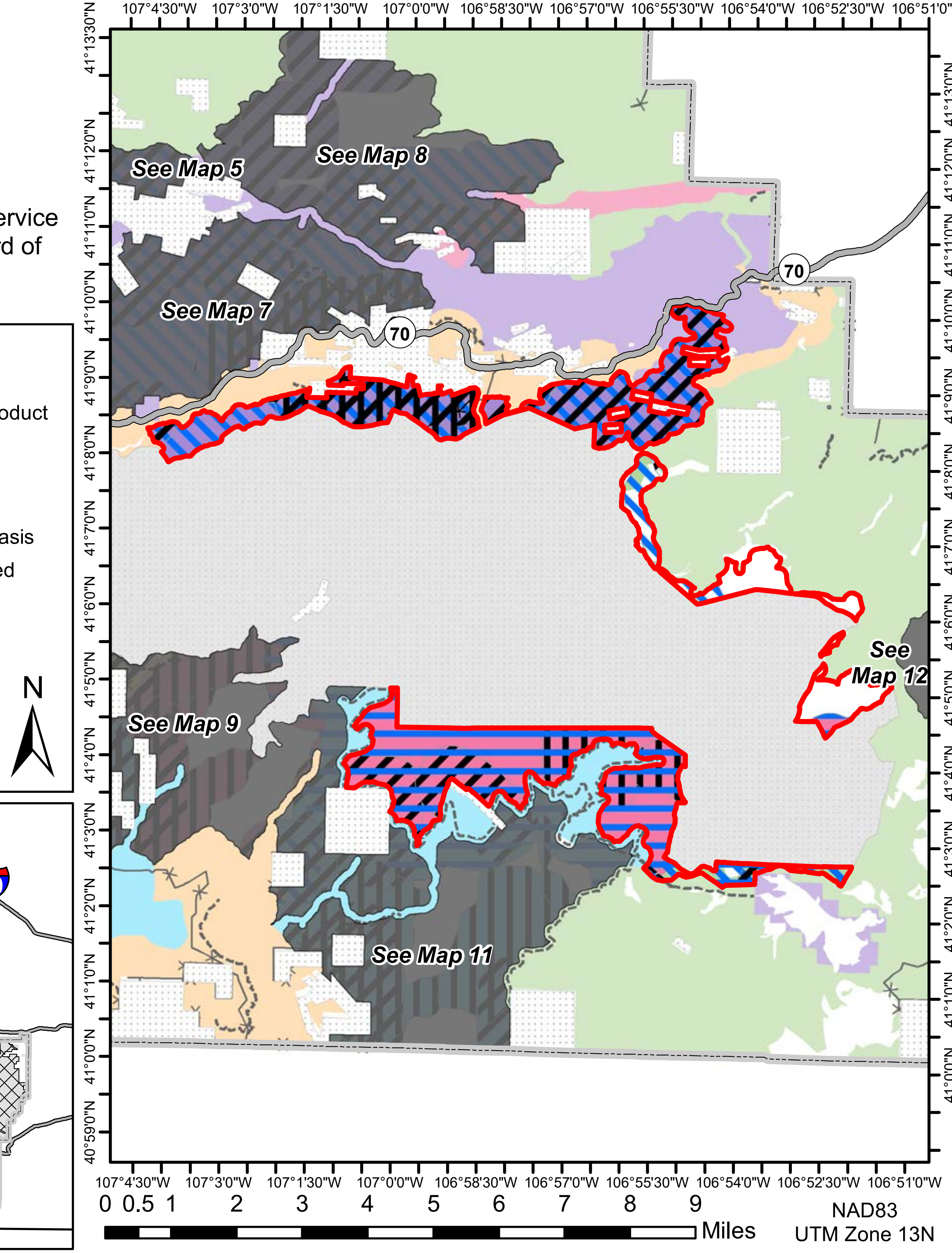

11: Solomon Creek Roadless Area

Total Roadless Area Acres: 5,756

Acres in Treatment Opportunity Areas: 4,424

Treatment Requests: Forest Service WUI, Wyoming Game and Fish Department, Cheyenne Board of Public Utilities

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

- Wyoming Game and Fish Department
- County Community At Risk
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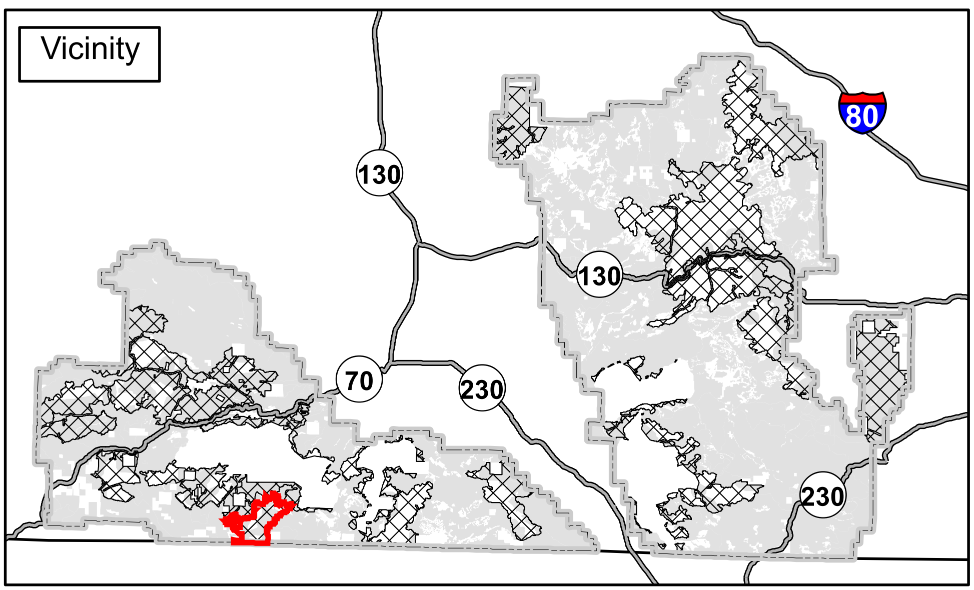

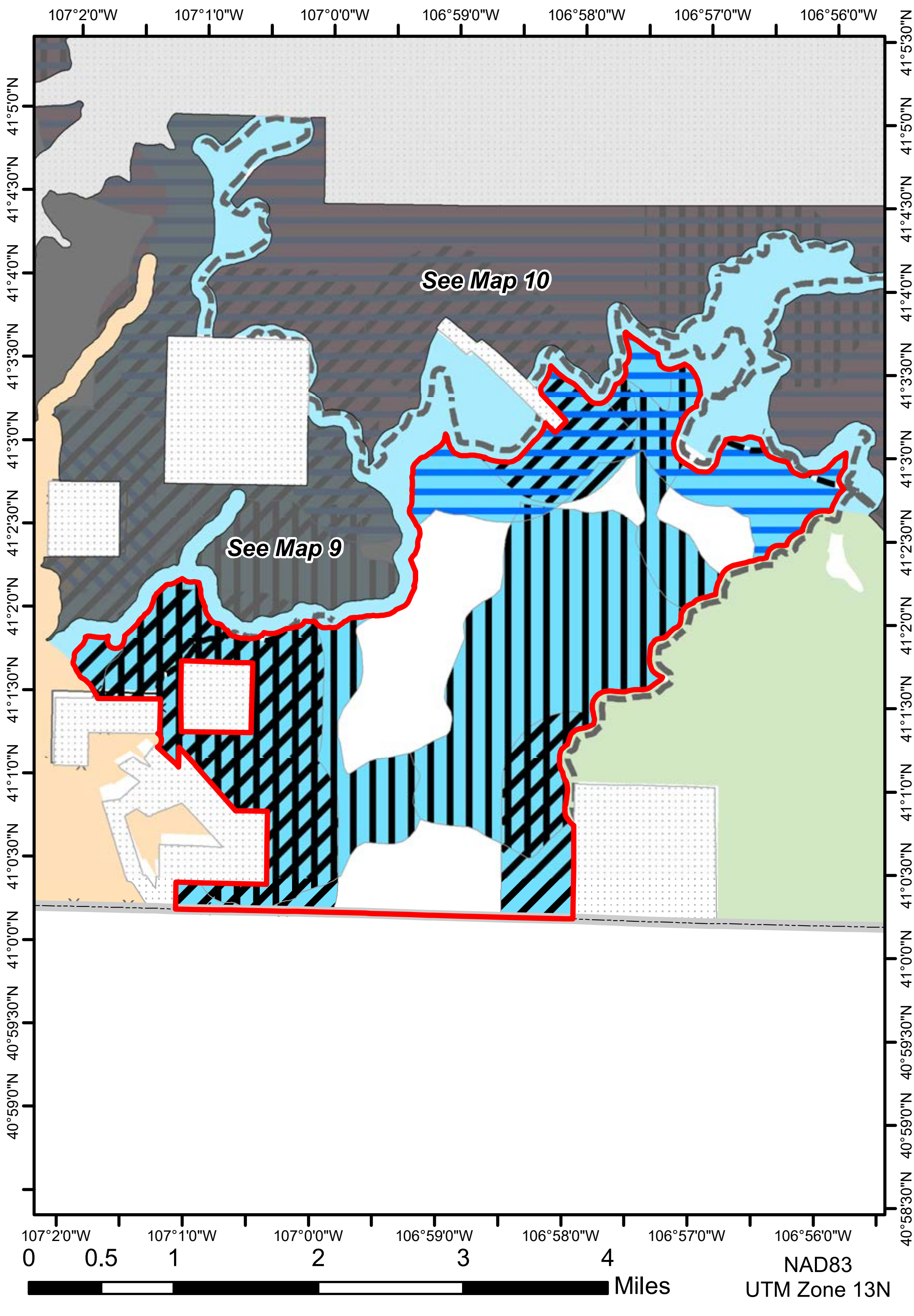

12: Encampment River Addition Roadless Area

Total Roadless Area Acres: 4,982

Acres in Treatment Opportunity Areas: 1,121

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest
Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department
County Community At Risk
Cheyenne Board Of Public Utilities
USFS Boundary Treatment/WUI
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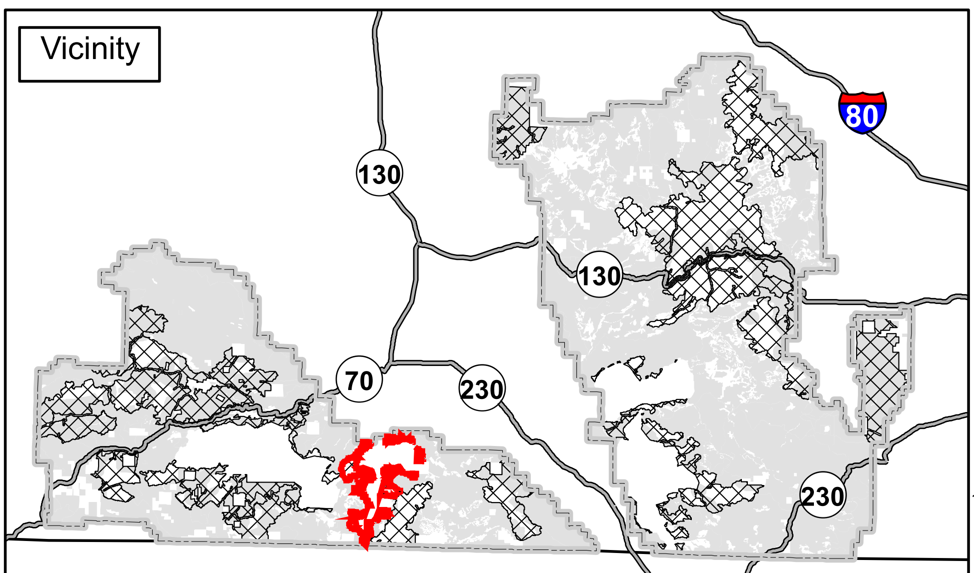
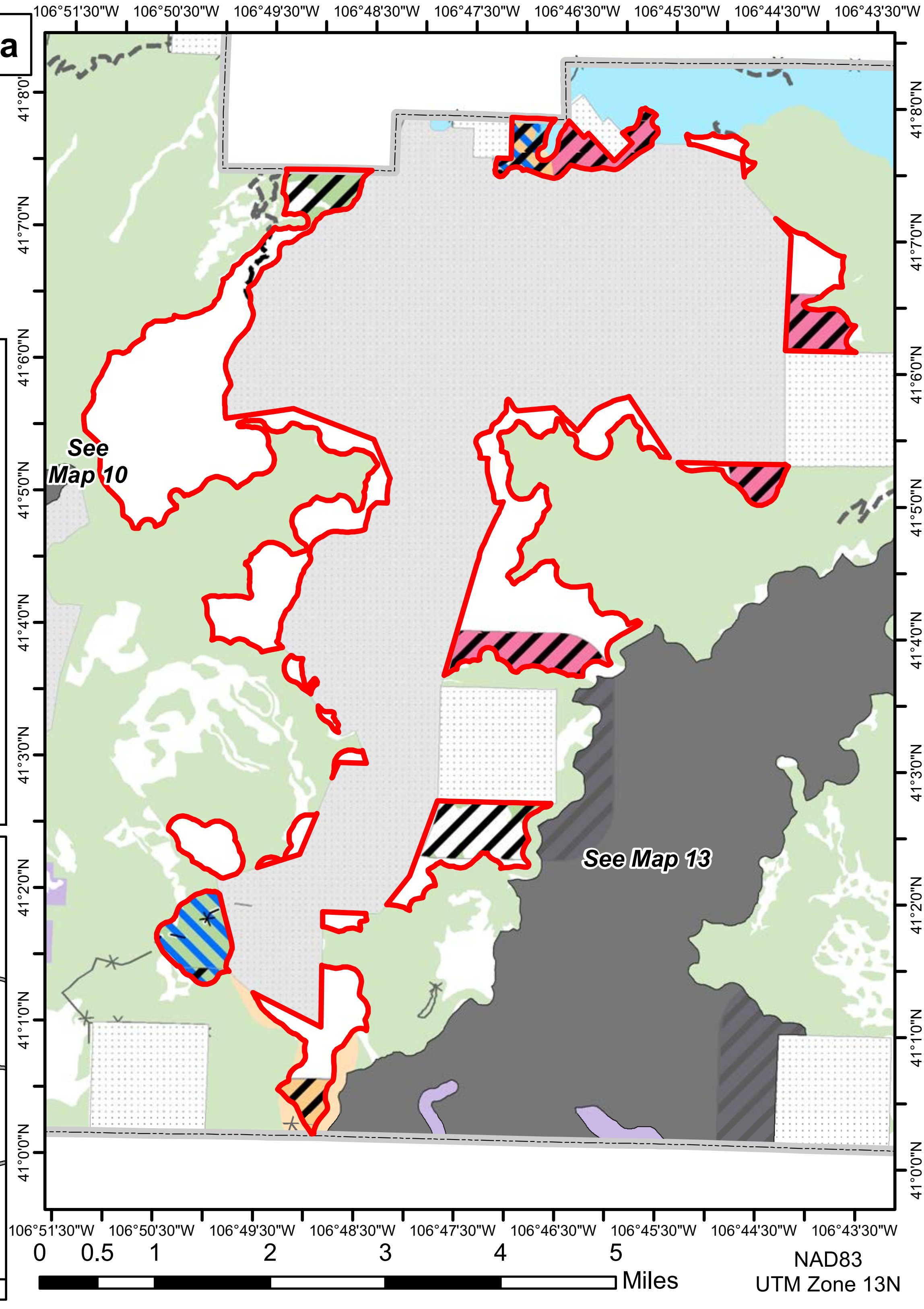
Wilderness Area
Non FS Inholding
Major Road
State Border
Forest Boundary

N





13: East Fork Encampment Roadless Area

Total Roadless Area Acres: 7,429

Acres in Treatment Opportunity Areas: 751

Treatment Requests: Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

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Major Road

State Border

Forest Boundary

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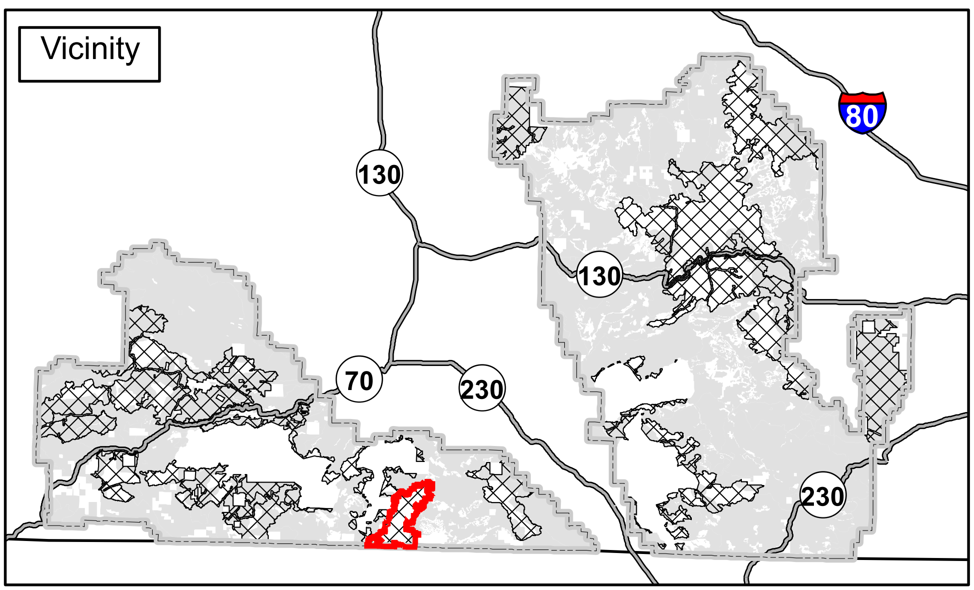
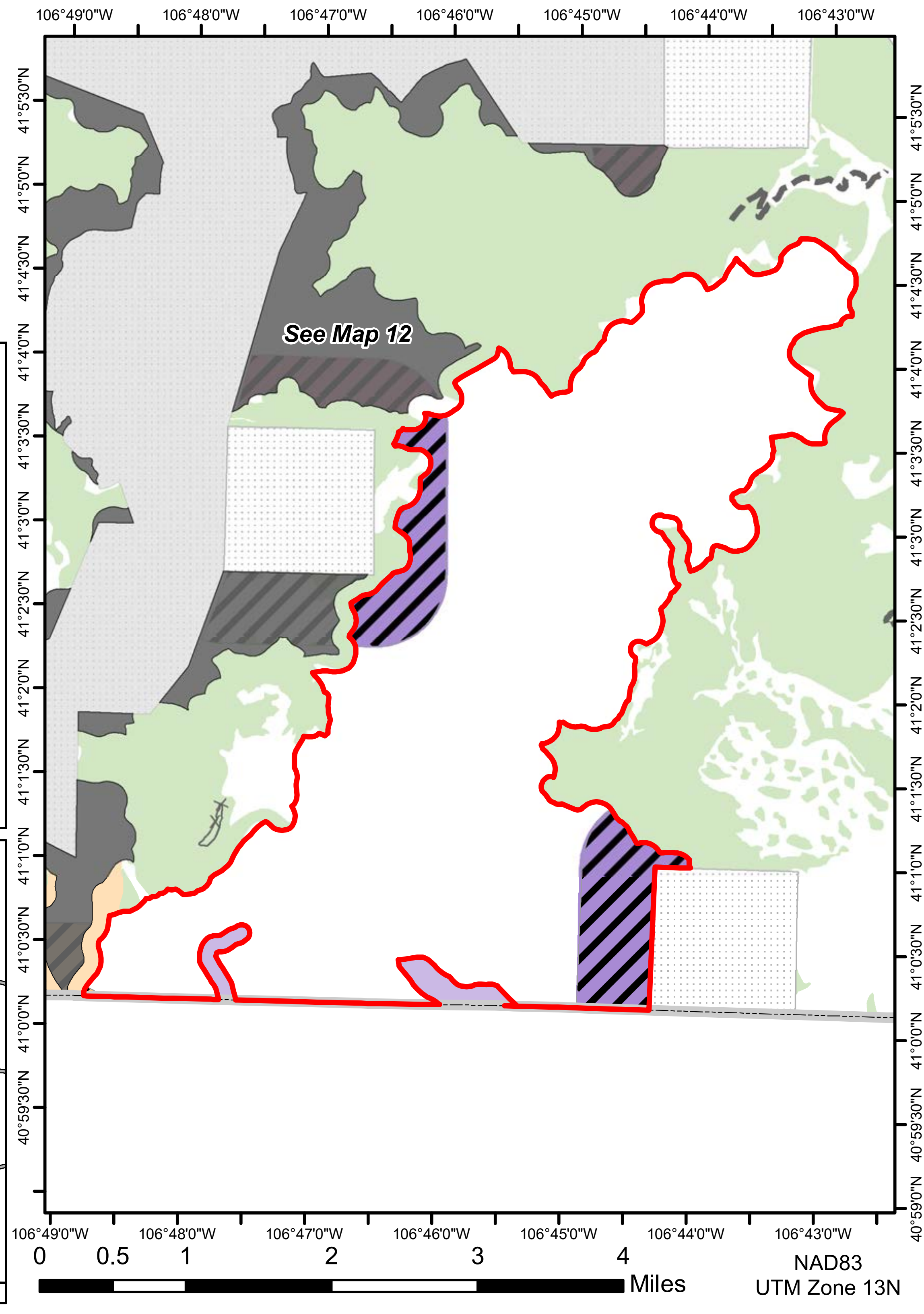




14: Bear Mountain Roadless Area

Total Roadless Area Acres: 9,426

Acres in Treatment Opportunity Areas: 5,659

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

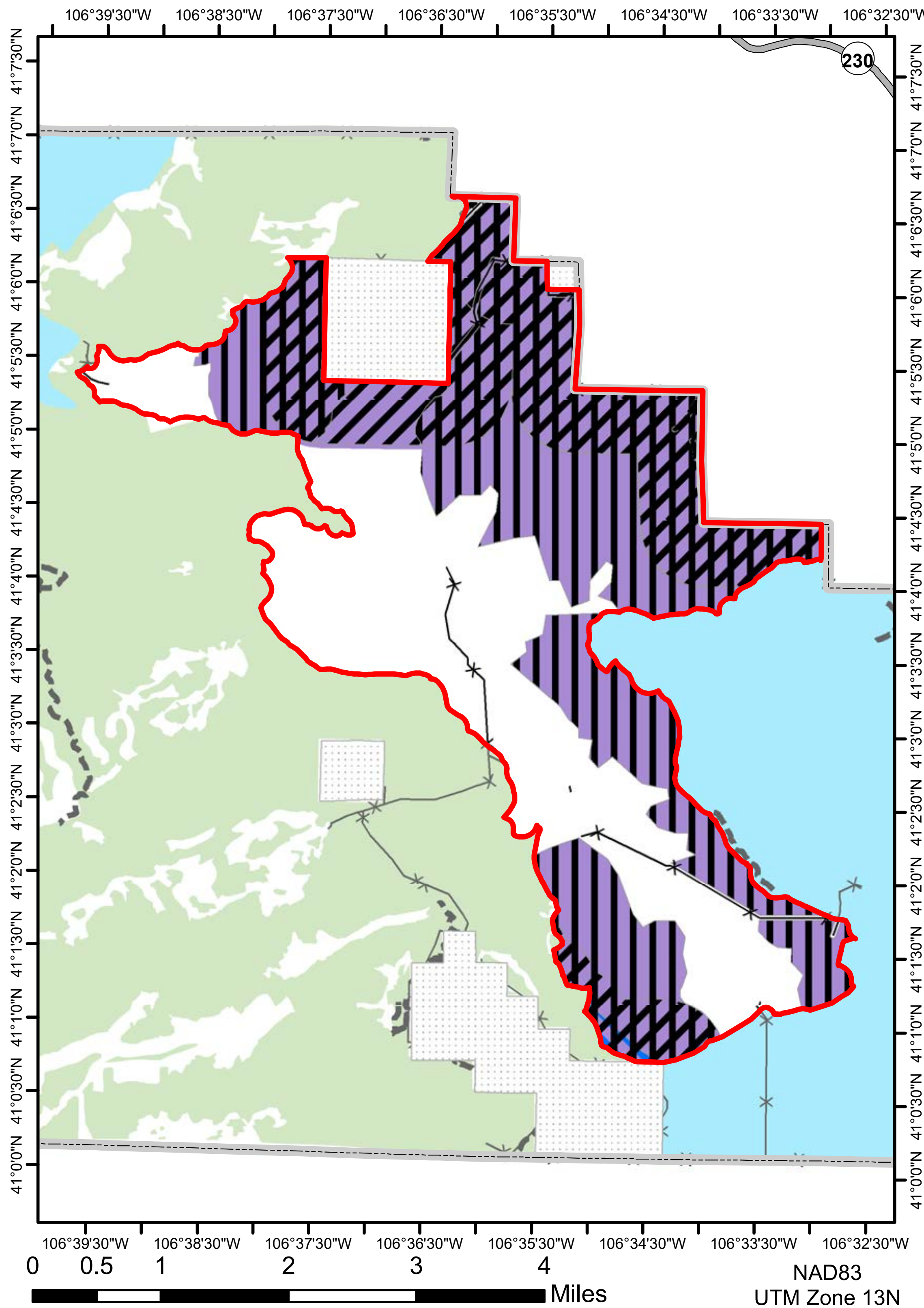
Requesting Agency

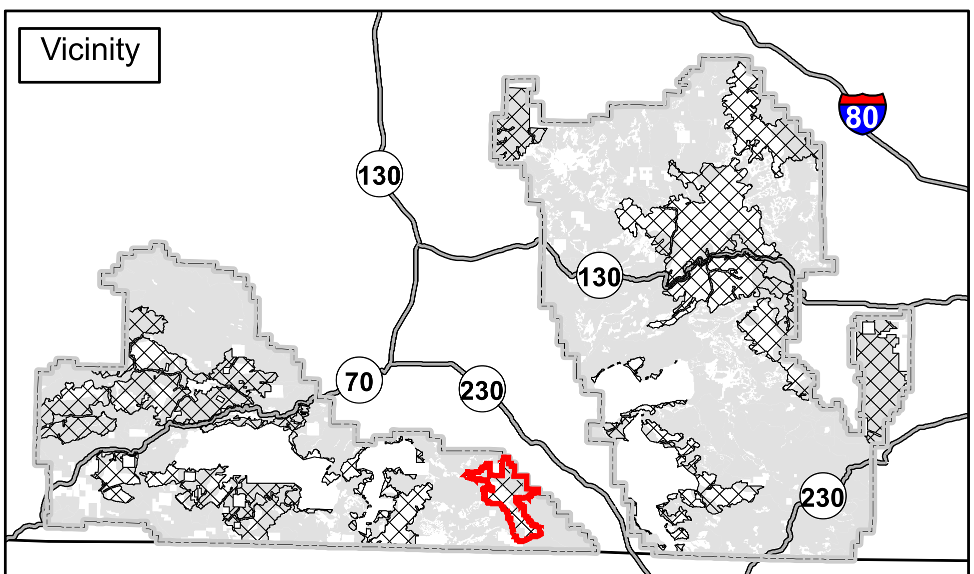
- Wyoming Game and Fish Department
- County Community At Risk
- Cheyenne Board Of Public Utilities
- USFS Boundary Treatment/WUI
- Ditch
- Fence

Treatment Opportunity Areas

- Forest and Rangeland Resiliency and Forest Product Emphasis
- Wildlife Emphasis
- Recreation Emphasis
- Scenic and Aspen Emphasis
- Special Emphasis (Limited Suite of Tools)
- Wilderness Area
- Non FS Inholding
- Major Road
- State Border
- Forest Boundary

N





15: Pennock Mountain Roadless Area

Total Roadless Area Acres: 9,592

Acres in Treatment Opportunity Areas: 9,493

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest
Other Inventoried Roadless Areas

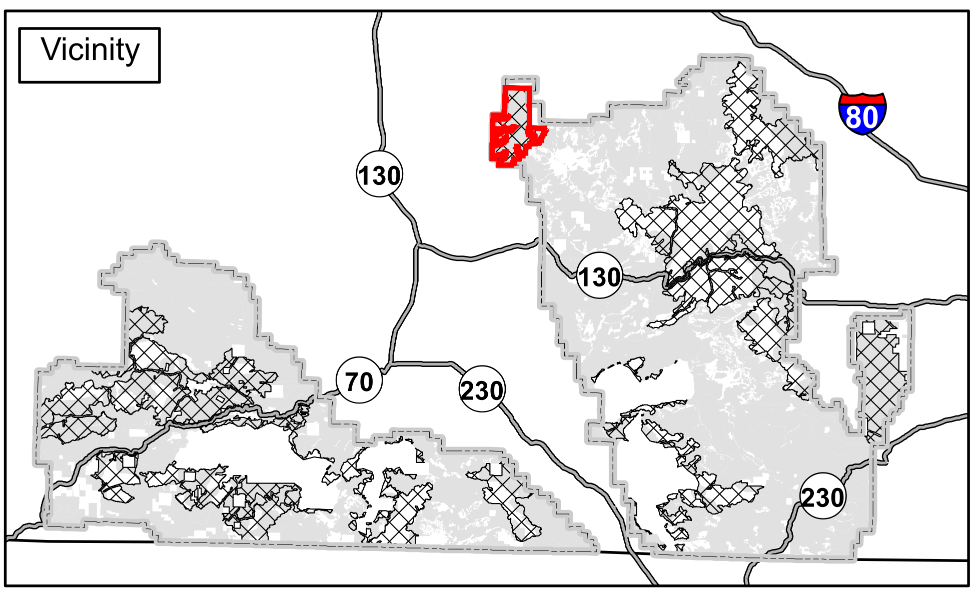
Requesting Agency

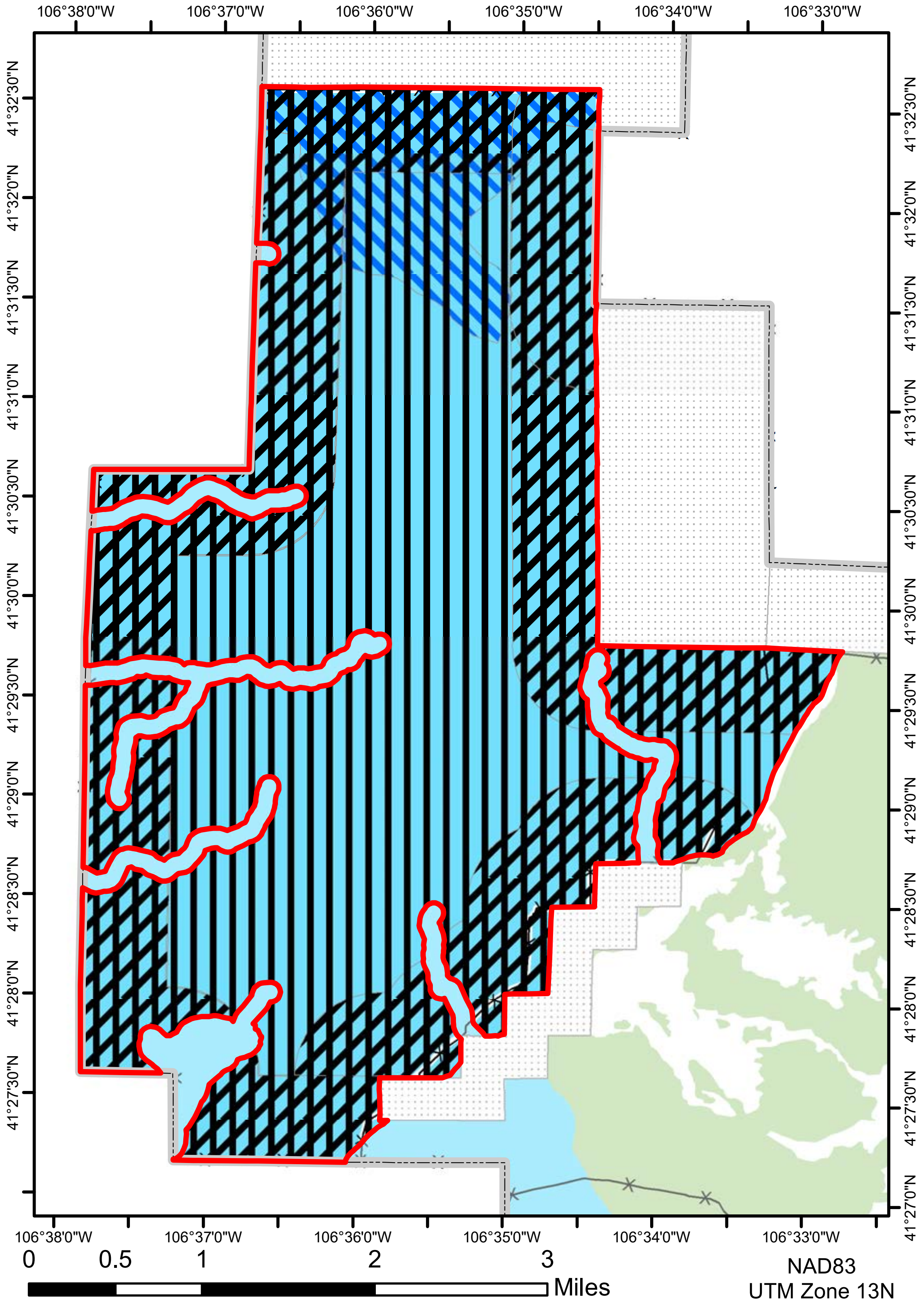
Wyoming Game and Fish Department
County Community At Risk
Cheyenne Board Of Public Utilities
USFS Boundary Treatment/WUI
Ditch
Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis
Wildlife Emphasis
Recreation Emphasis
Scenic and Aspen Emphasis
Special Emphasis (Limited Suite of Tools)
Wilderness Area
Non FS Inholding
Major Road
State Border
Forest Boundary

N





16: Savage Run Addition Roadless Area

Total Roadless Area Acres: 2,370

Acres in Treatment Opportunity Areas: 372

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

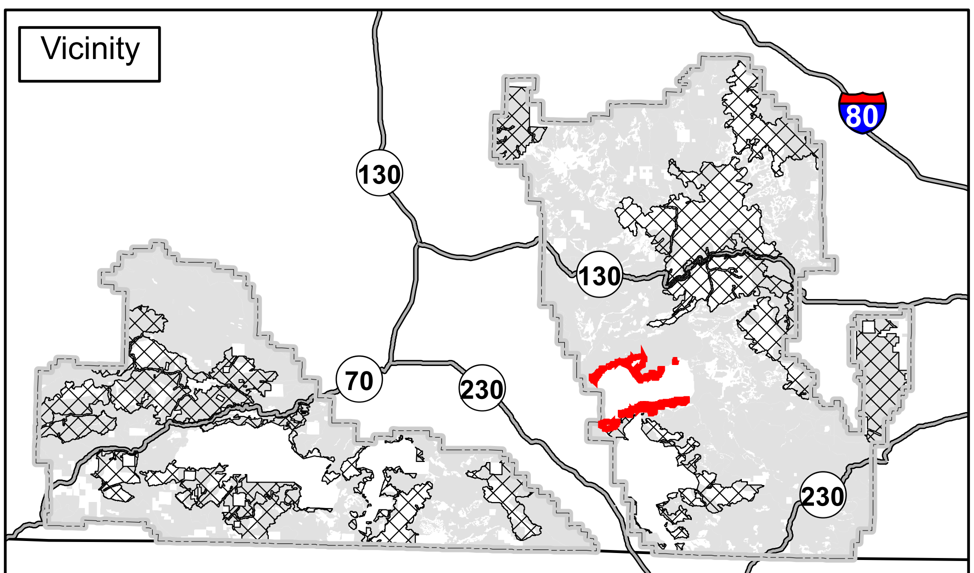
- Inventoried Roadless Area of Interest
- Other Inventoried Roadless Areas

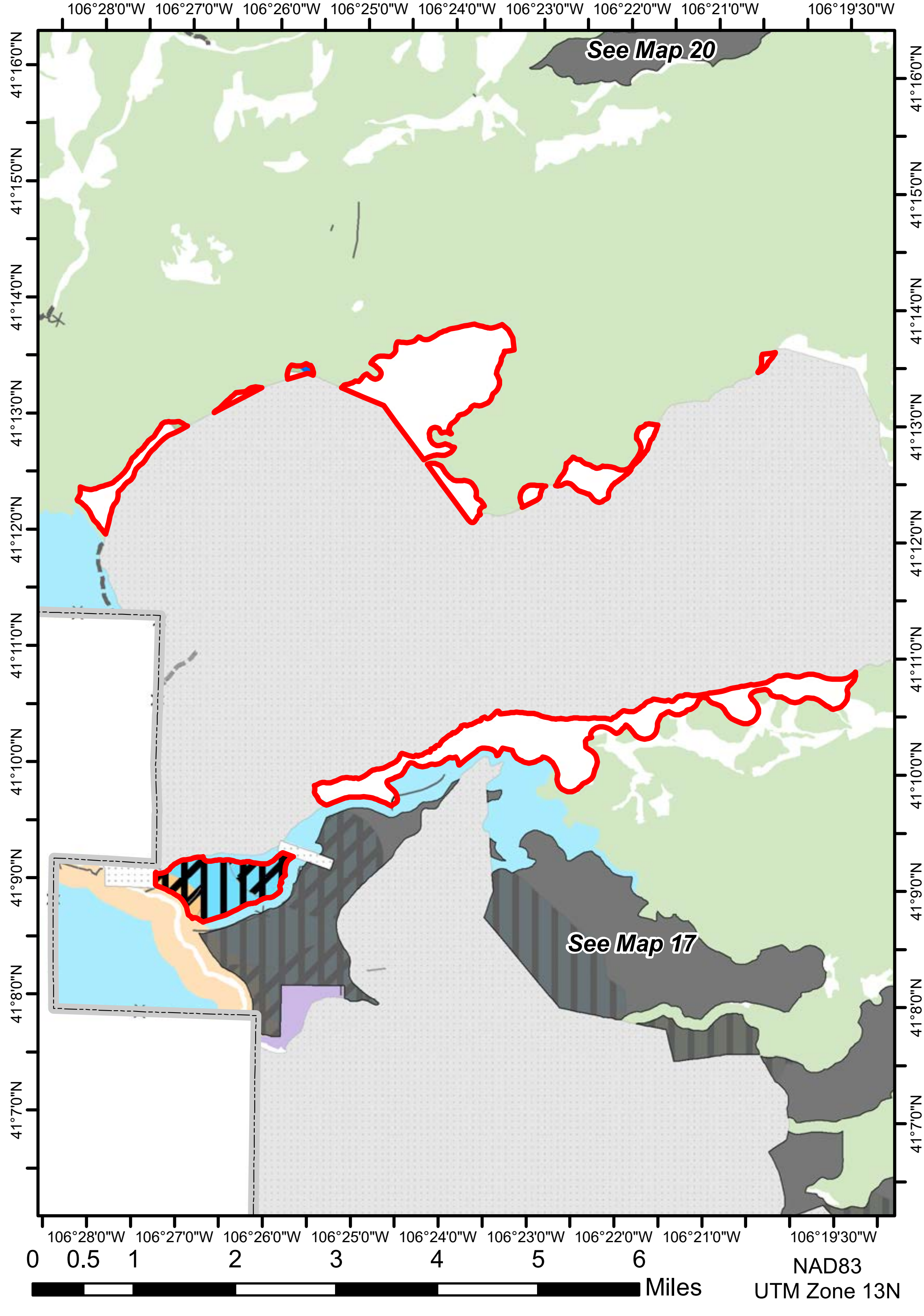
Requesting Agency

- Wyoming Game and Fish Department
- County Community At Risk
- Cheyenne Board Of Public Utilities
- USFS Boundary Treatment/WUI
- Ditch
- Fence

Treatment Opportunity Areas

- Forest and Rangeland Resiliency and Forest Product Emphasis
- Wildlife Emphasis
- Recreation Emphasis
- Scenic and Aspen Emphasis
- Special Emphasis (Limited Suite of Tools)
- Wilderness Area
- Non FS Inholding
- Major Road
- State Border
- Forest Boundary





17: Platte River Addition Roadless Area

Total Roadless Area Acres: 7,948

Acres in Treatment Opportunity Areas: 3,377

Treatment Requests: Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

Wildlife Emphasis

Recreation Emphasis

Scenic and Aspen Emphasis

Special Emphasis (Limited Suite of Tools)

Wilderness Area

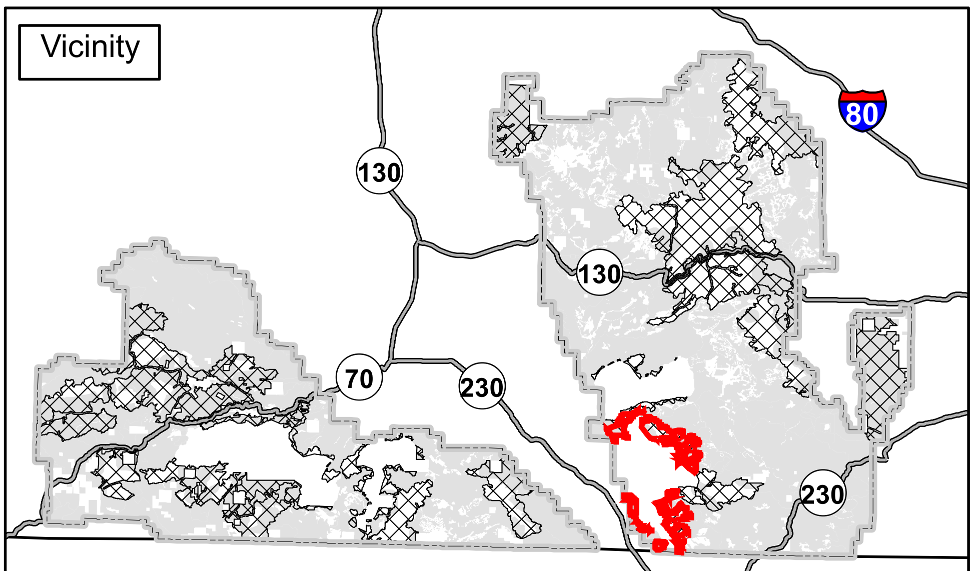
Non FS Inholding

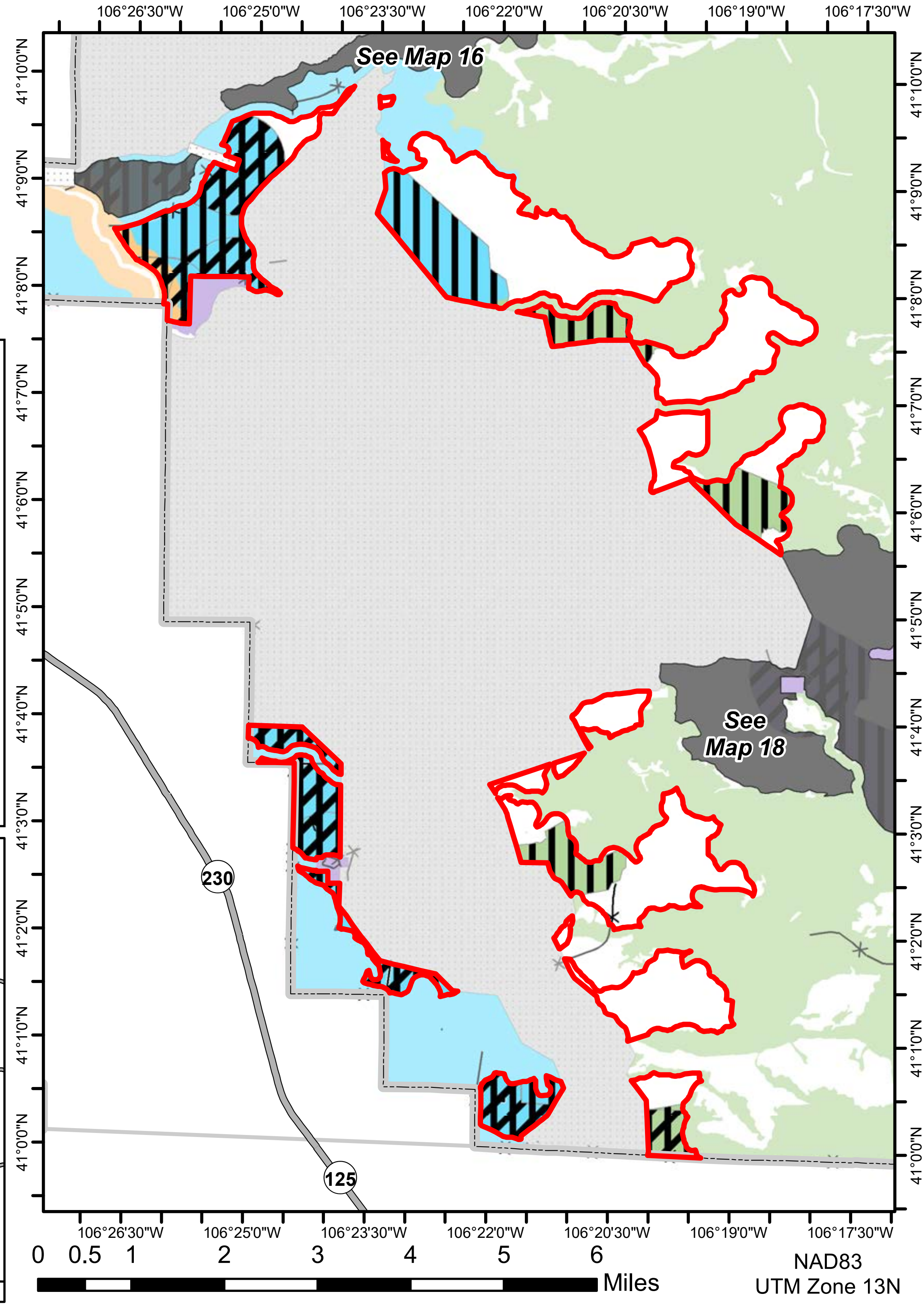
Major Road

State Border

Forest Boundary

N





18: Illinois Creek Roadless Area

Total Roadless Area Acres: 6,708

Acres in Treatment Opportunity Areas: 1,971

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

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Forest and Rangeland Resiliency and Forest Product Emphasis

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Scenic and Aspen Emphasis

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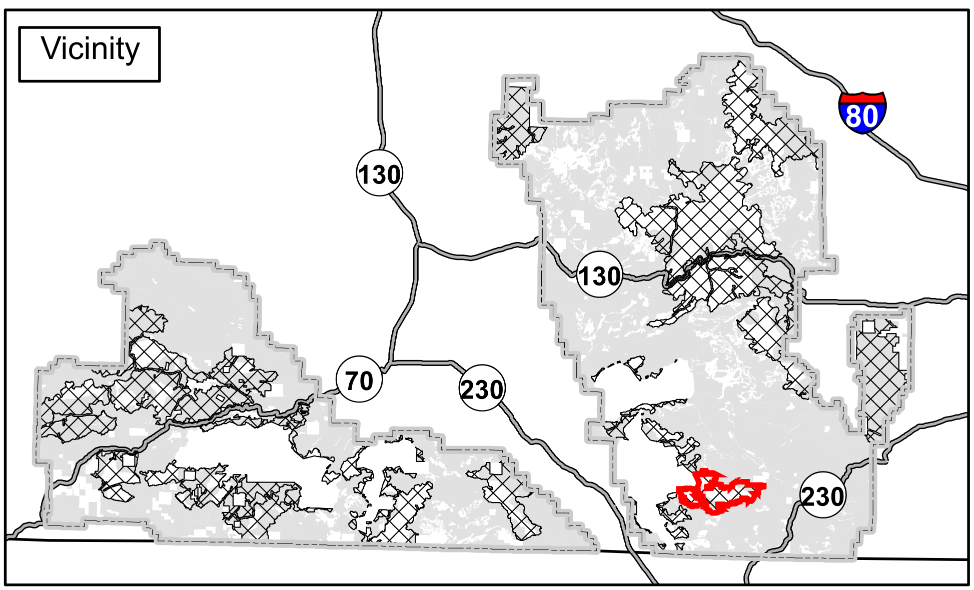
Wilderness Area

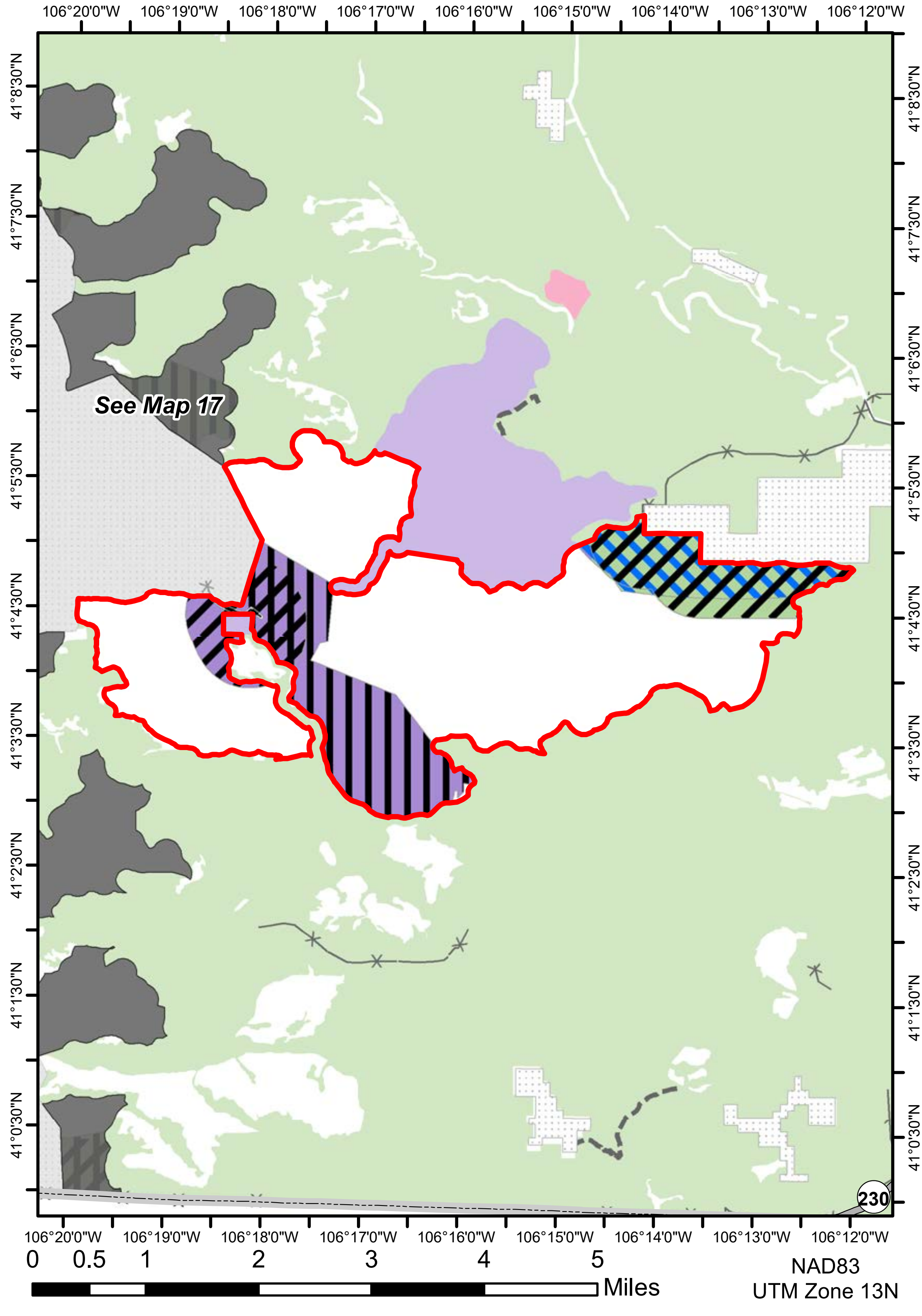
Non FS Inholding

Major Road

State Border

Forest Boundary





19: Campbell Lake Roadless Area

Total Roadless Area Acres: 7,085

Acres in Treatment Opportunity Areas: 1,463

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

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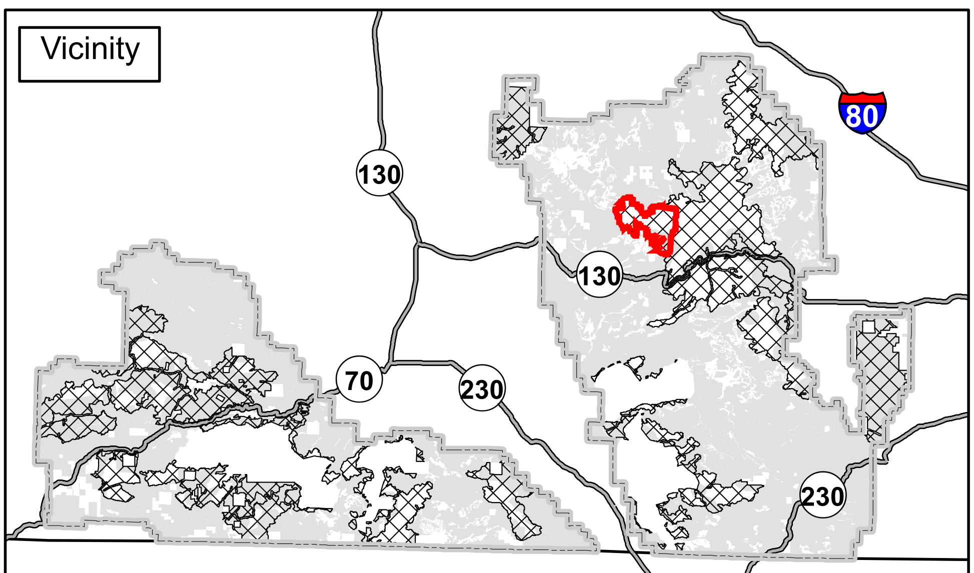
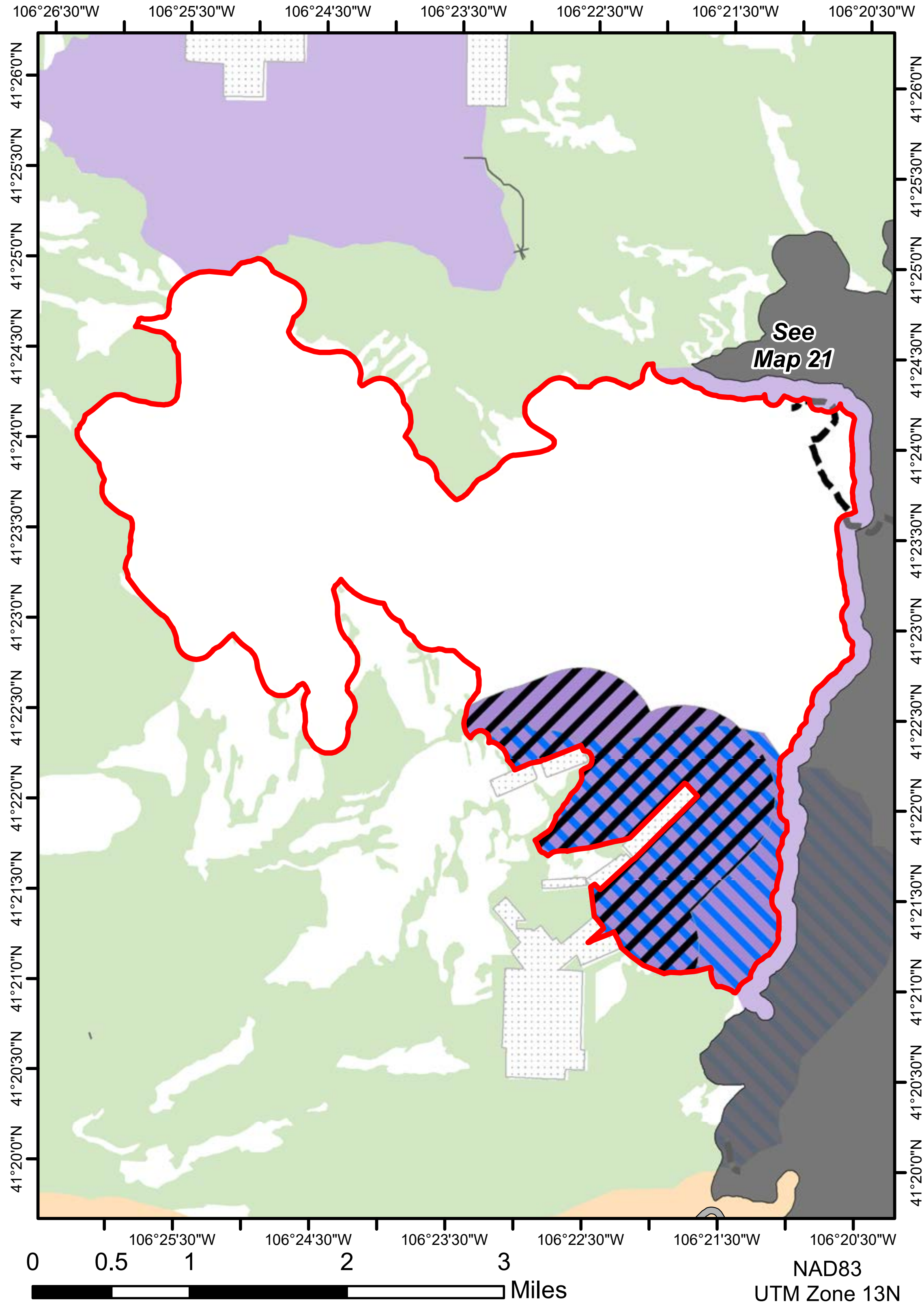
Major Road

State Border

Forest Boundary





20: French Creek Roadless Area

Total Roadless Area Acres: 5,925

Acres in Treatment Opportunity Areas: 285

Treatment Requests: Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

Ditch

Fence

Treatment Opportunity Areas

Forest and Rangeland Resiliency and Forest Product Emphasis

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Non FS Inholding

Major Road

State Border

Forest Boundary

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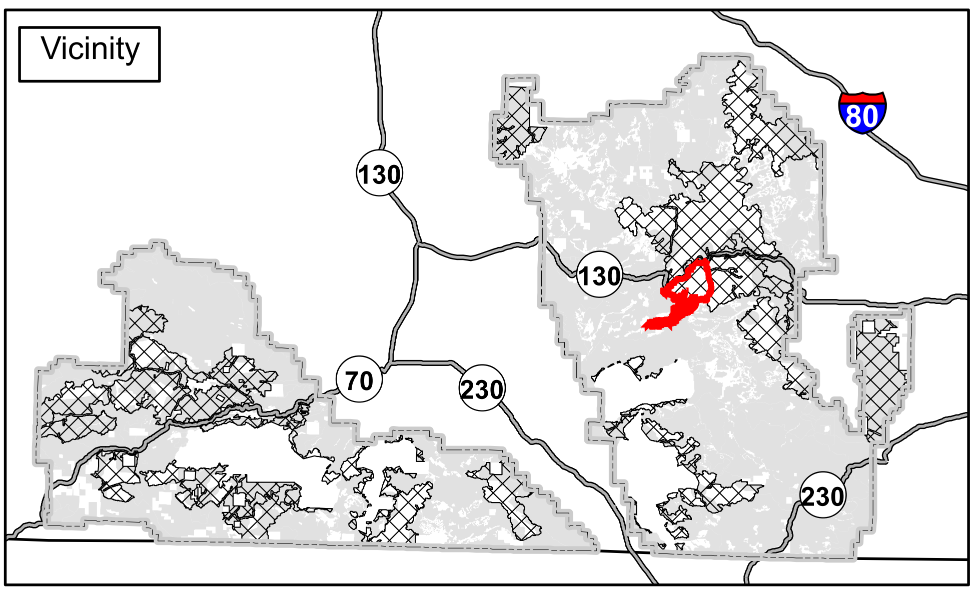

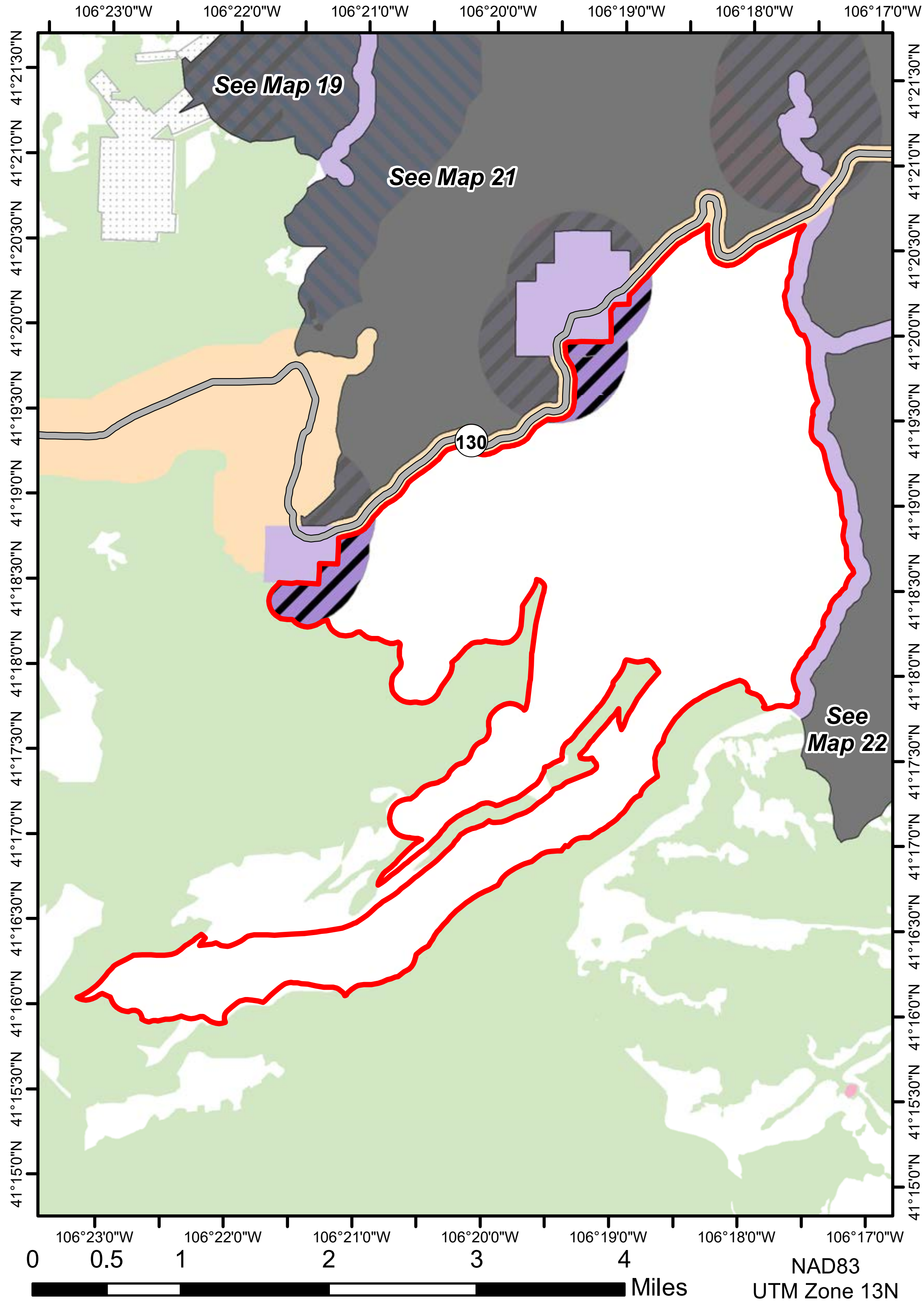

21: Snowy Range Roadless Area

Total Roadless Area Acres: 29,637

Acres in Treatment Opportunity Areas: 5,912

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

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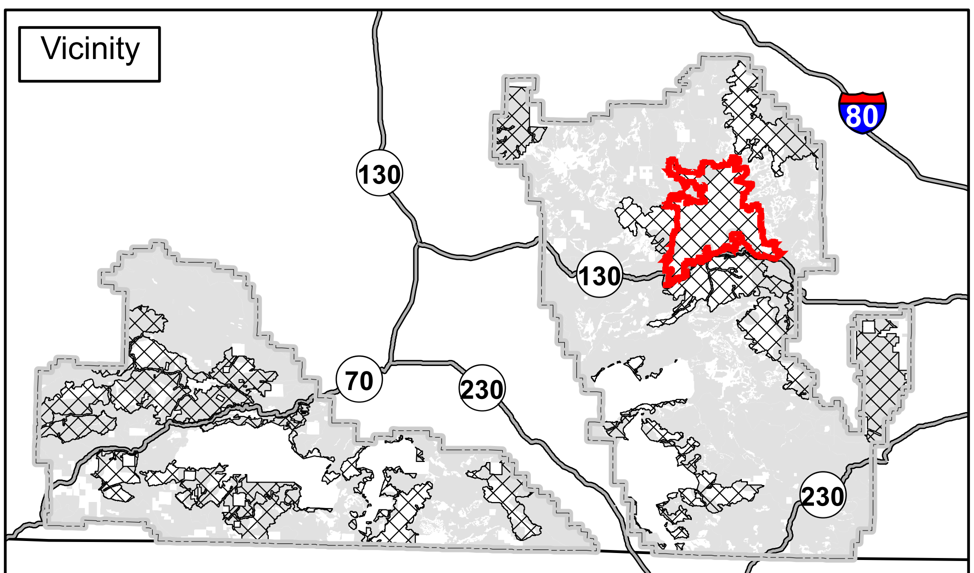
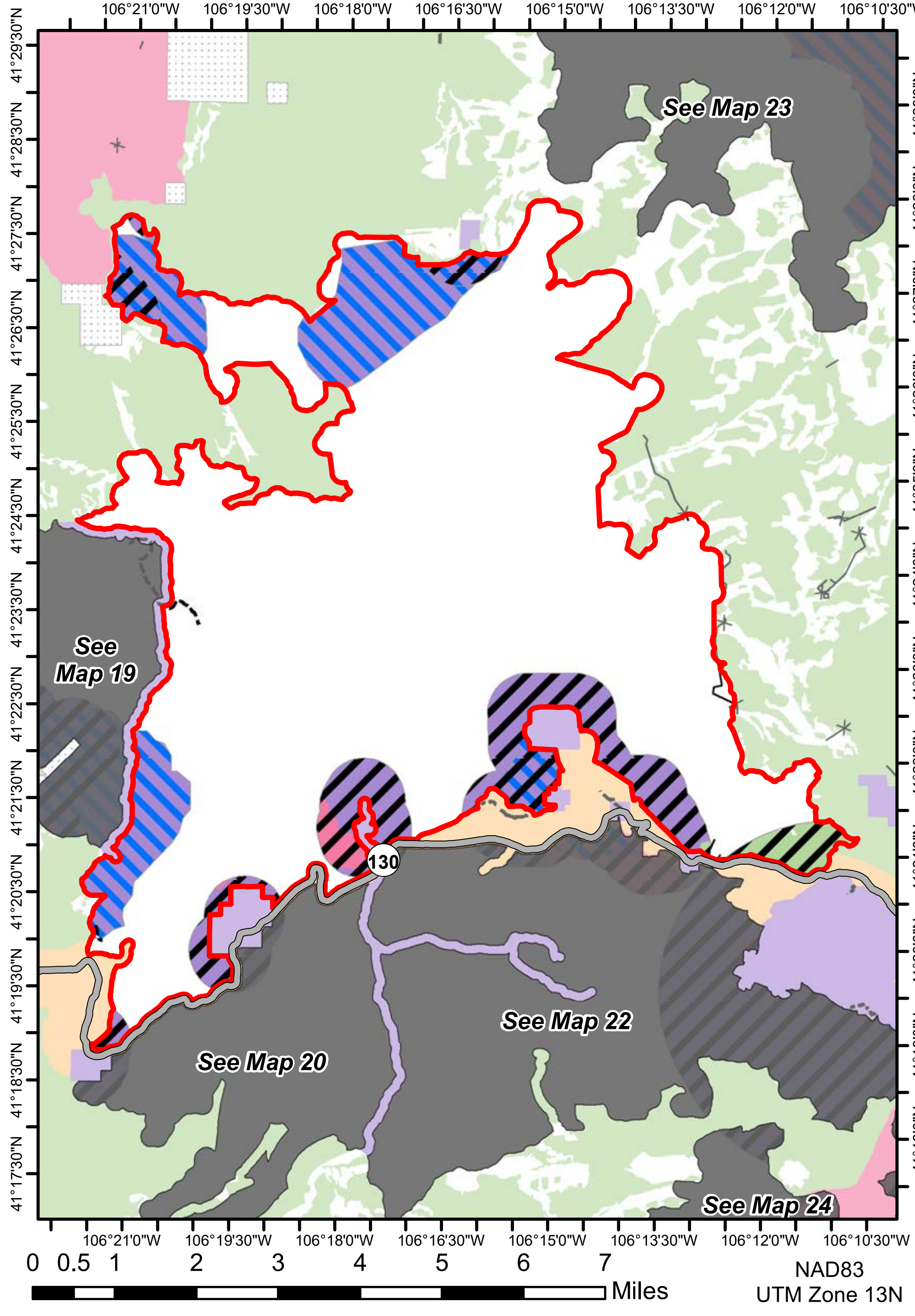
State Border

Forest Boundary





22: Libby Flats Roadless Area

Total Roadless Area Acres: 11,082

Acres in Treatment Opportunity Areas: 3,617

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

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Major Road

State Border

Forest Boundary

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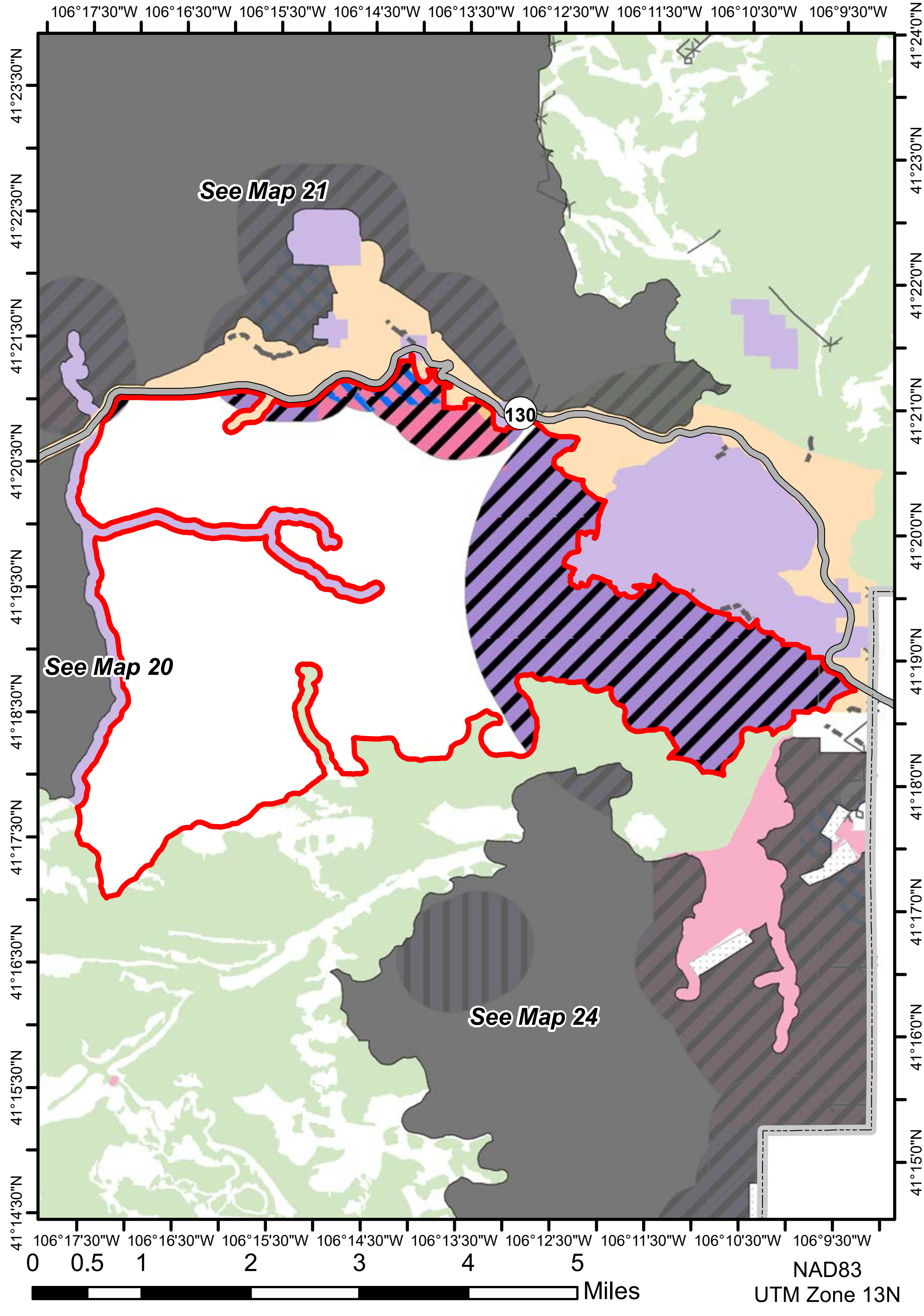

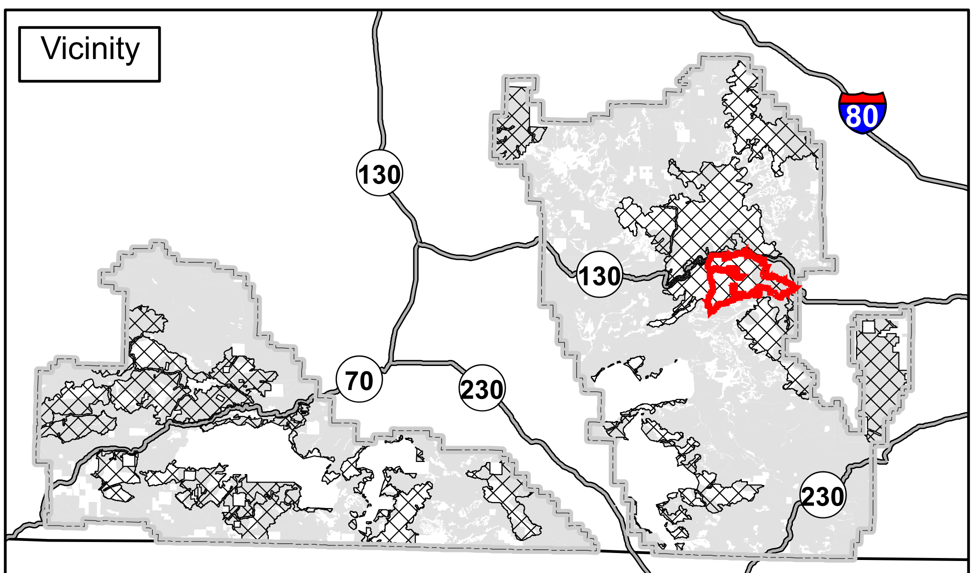

23: Rock Creek Roadless Area

Total Roadless Area Acres: 18,859

Acres in Treatment Opportunity Areas: 6,778

Treatment Requests: County Community at Risk, Forest Service WUI

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

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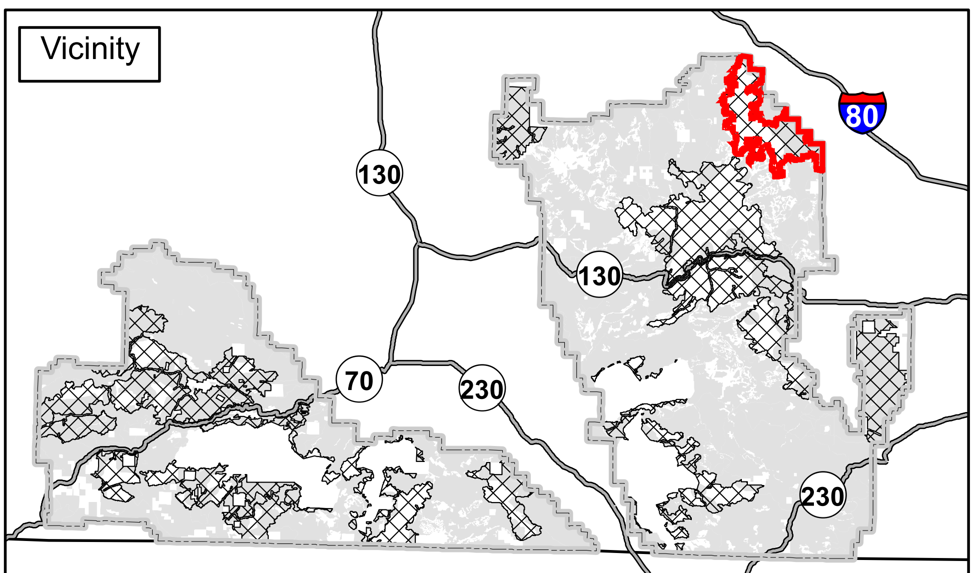
Non FS Inholding

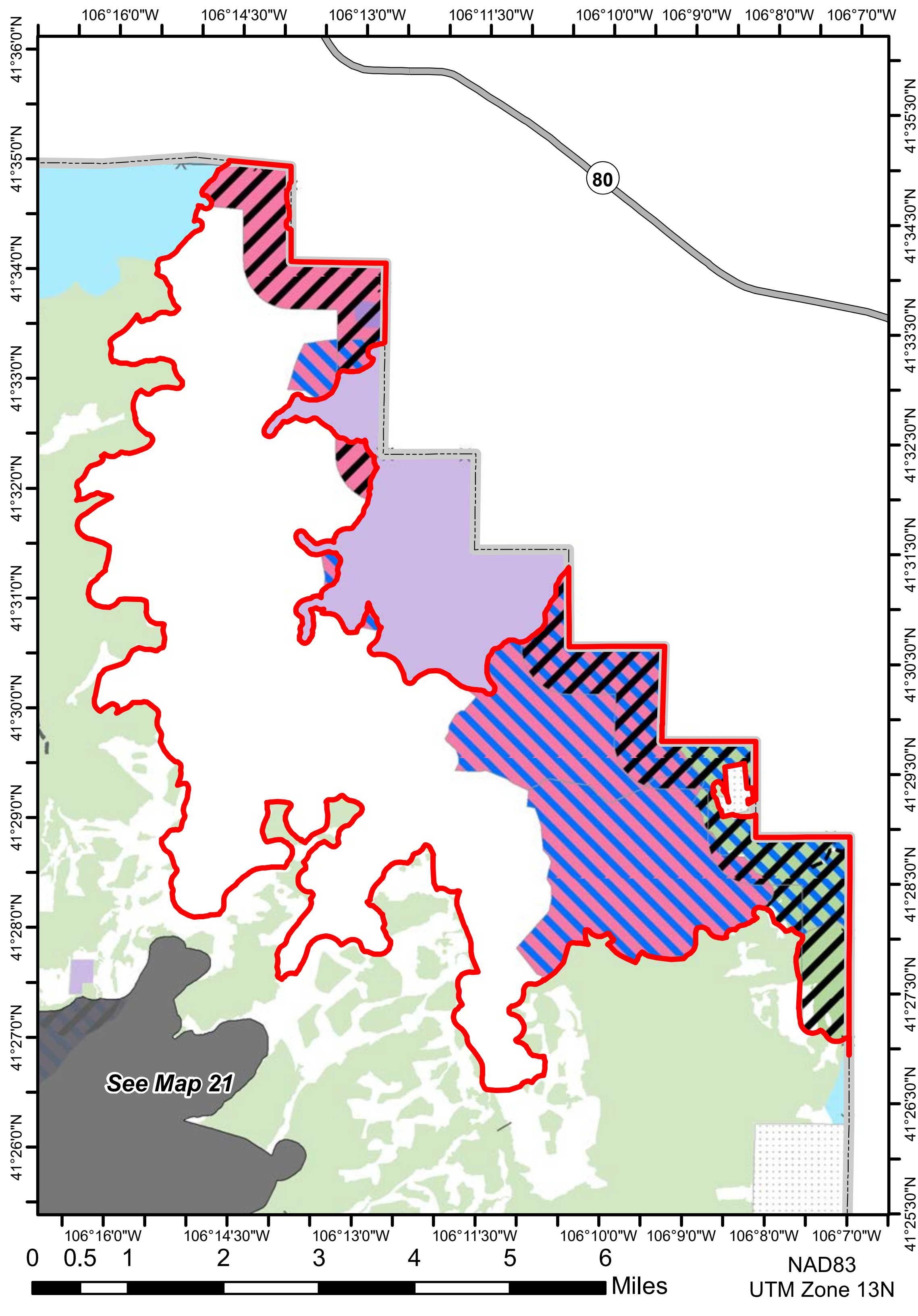
Major Road

State Border

Forest Boundary

N





24: Middle Fork Roadless Area

Total Roadless Area Acres: 13,232

Acres in Treatment Opportunity Areas: 6,646

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest

Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department

County Community At Risk

Cheyenne Board Of Public Utilities

USFS Boundary Treatment/WUI

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Major Road

State Border

Forest Boundary

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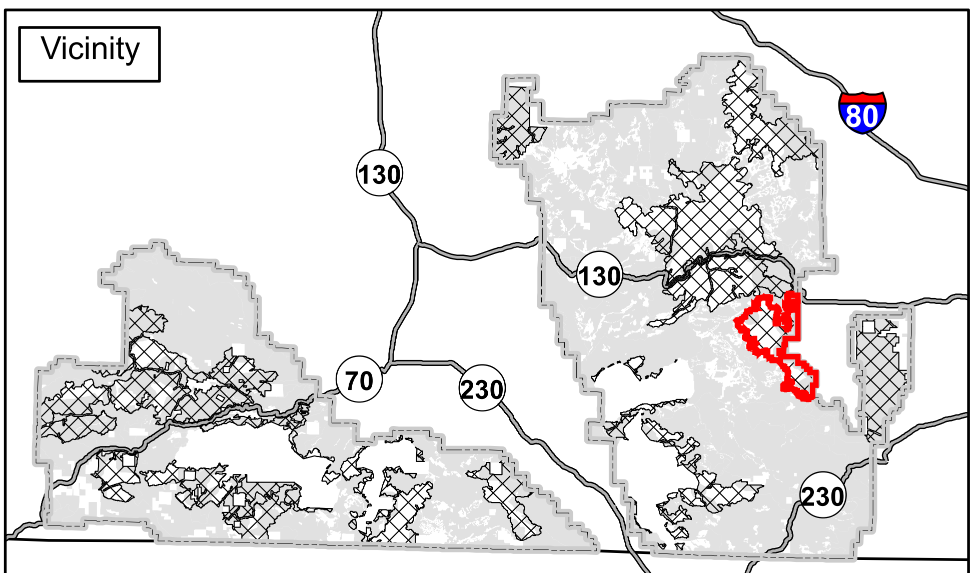

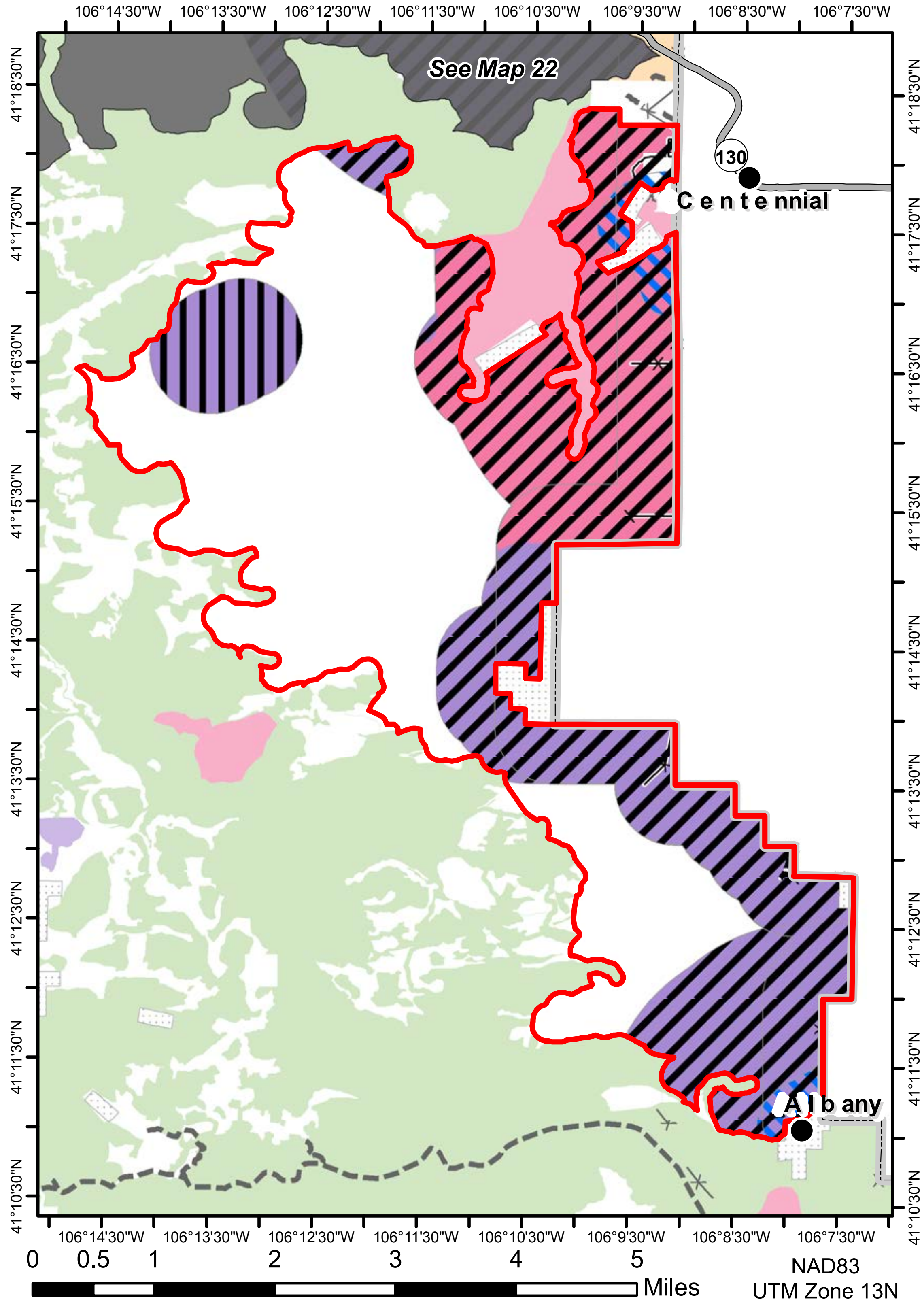

25: Sheep Mountain Roadless Area

Total Roadless Area Acres: 17,614

Acres in Treatment Opportunity Areas: 17,573

Treatment Requests: County Community at Risk, Forest Service WUI, Wyoming Game and Fish Department

Inventoried Roadless Area of Interest
Other Inventoried Roadless Areas

Requesting Agency

Wyoming Game and Fish Department
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Cheyenne Board Of Public Utilities
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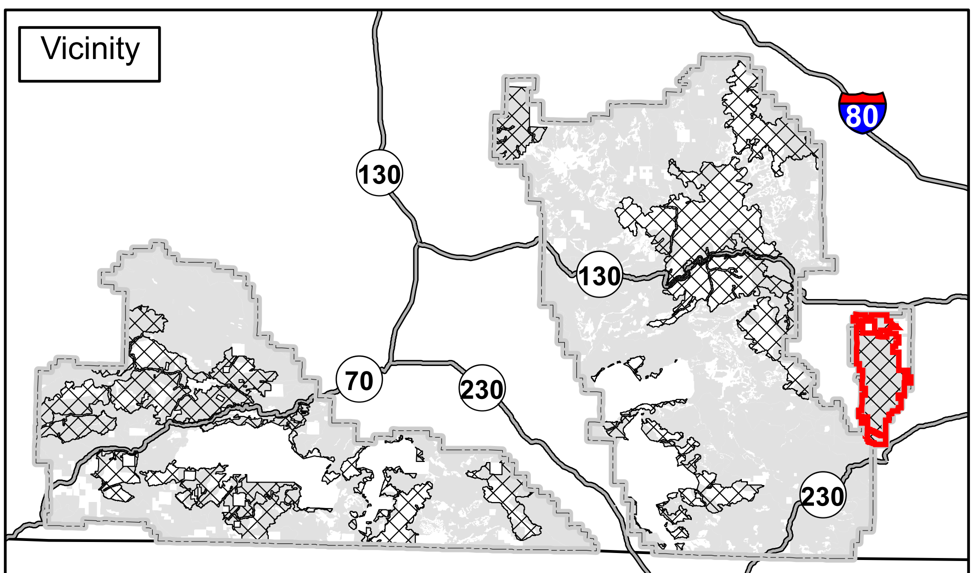

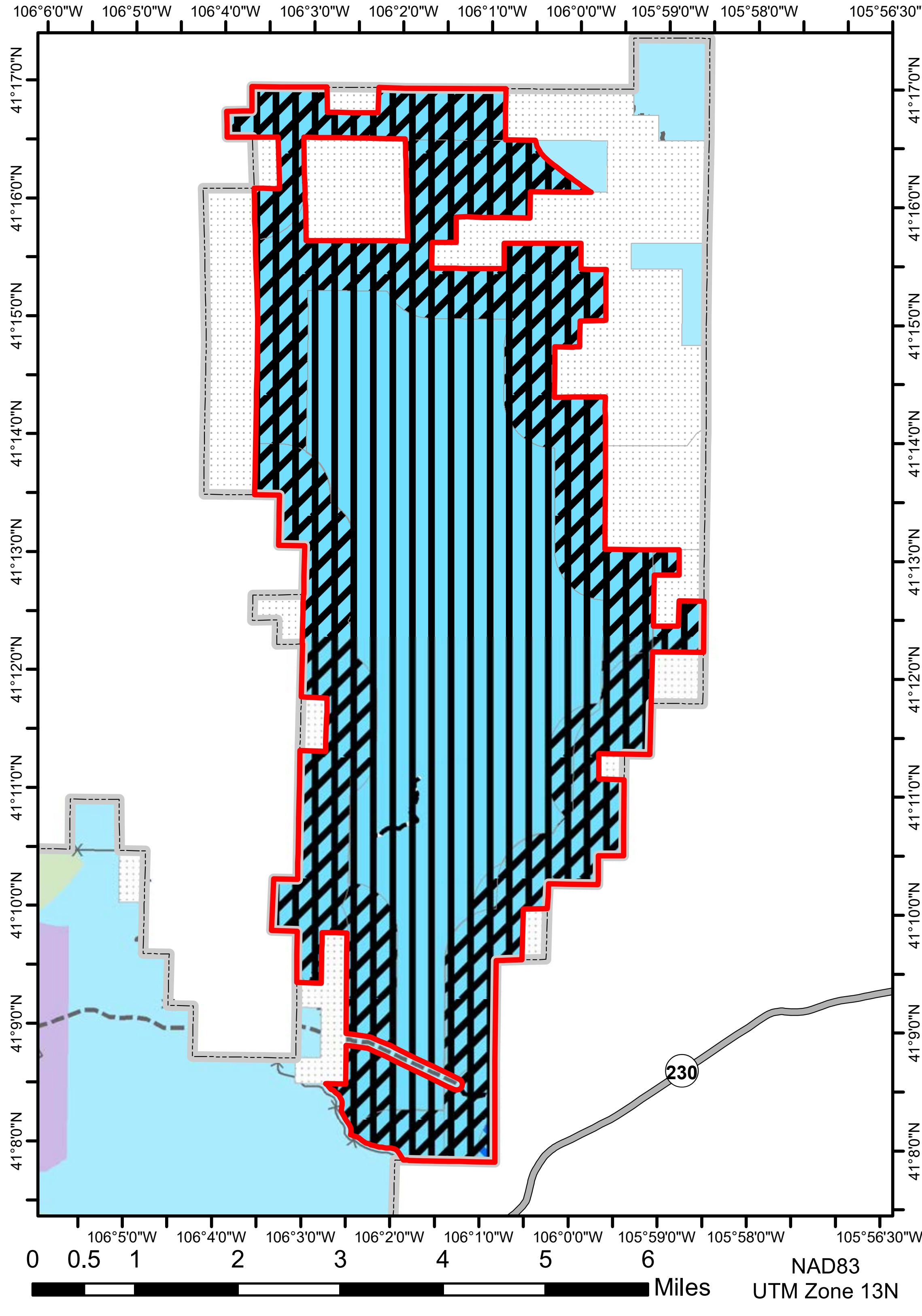

Wyoming State Forestry Division

THE FOREST RESOURCE AGENCY OF WYOMING

5500 Bishop Blvd
Cheyenne, WY 82002
Phone: (307) 777-7586

Forestry@wyo.gov

Matthew H. Mead
Governor

Bill Crapser
State Forester

April 21st, 2017

Melissa Martin
Medicine Bow-Routt National Forest
2468 Jackson Street
Laramie, WY 82070

Dear Ms. Martin,

In response to the US Forest Service's latest LAVA Project data request from the April 12th cooperator's meeting, we would offer the following comments that further justify and provide additional rationale to our March 30th data submission. The prior information solicitation form the Forest had a number of requests, but in particular, asked if our agency had a need/desire to treat in the white or stippled areas, and if so, why. While the white areas primarily represented wilderness designation and old growth timber in MA 5.15, the Forest stated that the stippled areas needed strong justification to conduct treatments as these areas included mostly inventoried roadless areas.

The Wyoming State Forestry Division responded in our March 30th letter that we felt it was appropriate and necessary to treat, or have the ability to treat, certain parts of the stippled areas on US Forest Service lands adjacent state and private land, providing the opportunity for a ½ mile buffer. Most of this adjacent US Forest Service land has not had recent vegetation treatments and presents an increased risk of catastrophic wildfires. Below are some additional points that provide rationale as to why it is necessary to treat in the stippled areas.

1. The Wyoming State Trust Land includes land granted by the federal government to the State of Wyoming at the time of statehood under various acts of the U.S. Congress and accepted and governed under Article 18 of the Wyoming Constitution. The revenues generated by trust lands and minerals are reserved for the exclusive benefit of the beneficiaries designated in the congressional acts. The Wyoming State Constitution and the Wyoming State Legislature mandate that trust assets be managed for two key purposes consistent with traditional trust principles: 1) long-term growth in value, and 2) optimum, sustainable revenue production.

   The State has been successful in their diligent management efforts of these state land parcels in and around the project area, with the intent to continue active forest management in the future to mitigate the potential negative impacts from catastrophic wildfire and future forest health issues. The limited opportunity to treat in the stippled areas outlined in the LAVA project would present a liability to these state assets and threaten sustainable management and associated future revenue generation.

2. The USDA Forest Service Strategic Plan: FY 2015-2020 also supports the idea of conducting treatments in the stippled areas to protect private and state lands. There are numerous references of working with state agencies to achieve land management goals and desired future conditions. Strategic Objective B of the plan is to mitigate wildfire risk (p.12) and more specifically to *"Reduce the danger from fire through forest restoration on Federal land, non-Federal land, and tribal land, especially where there is a high wildfire threat to communities and to the values that people get from forests and grasslands, such as clean water."*

   We have supported the USDA Strategic Plan and worked closely with the US Forest Service in the past and intend to in the future. The Plan also highlights the ability, importance and need for the agency to be proactive in situations like this.

3. The Forest Service is bound by law and policy to be a good neighbor. The National Fire Plan, the National Cohesive Wildland Fire Management Strategy, and the Healthy Forests Restoration Act commit the Forest Service to protecting human communities from wildfires originating on public lands by implementing hazardous fuel reduction projects on federal lands within the wildland-urban interface.

4. The Wyoming State Forestry Division has worked very closely with private landowners and invested extensive resources to help them successfully managed sustainable family forests for decades. These forests provide a multitude of benefits for forest users and the communities around them. Not allowing the opportunity for these private landowners to have treatments done on the bordering US Forest Service lands essentially penalizes them and jeopardizes the investments made on their family forests.

5. Firefighter safety cannot be compromised. Falling snags and hazard trees are currently the second leading cause of fatalities and serious injury during wildland firefighting operations, and high-intensity fire behavior (flame lengths above four feet and active crown fire) is dangerous and difficult to fight. Providing the ability to treat within the identified stippled buffer areas helps fire managers to fulfill the responsibility of managing fires on their respective lands while providing additional safety during fire suppression efforts.

6. As we approach the end of the latest bark beetle epidemic on the Medicine Bow National Forest, land managers are trying to address the sheer number of dead standing trees left behind. This problem creates several implications in regards to future wildfire behavior. As these trees begin to fall, they are creating massive amounts of heavy fuels that are orientated along the forest floor and will burn with the highest intensity in the next fire. The result is erratic and extreme fire behavior that has not been seen before on this Forest, as was highlighted in the Beaver Creek Fire which burned for several months last summer and caused extensive damage. The Beaver Creek Fire also illustrated that fires in beetle kill have very high spotting potential, prolific ember generation, and highly receptive fuel beds. A final lesson from Beaver Creek Fire was that low line production rates and poor fireline effectiveness in beetle killed stands result in fires that are extremely resistant to control. By allowing proactive treatments within ½ mile of state and private lands, the Forest can substantially increase their chance of successfully preventing fires from escaping NFS system lands

7. Treatment opportunities within the stippled buffer would also allow provide for better long-term forest health benefits by creating structural stage diversity, reducing homogeneous stand continuity, and increasing the overall resiliency of these treated areas. These desired future conditions have been identified and supported in the Medicine Bow-Routt National Forest Land and Resource Management Plan.

The Wyoming State Forestry Division has made a diligent effort using GIS analysis to further define the extent of treatment opportunity needed within these ½ mile buffers around State and private lands. In total, we calculate that there are approximately 43,225 acres of private land buffers needed and 11,882 acres of State land buffers needed. This analysis excludes acres in the buffers that likely present a low risk to fire hazard such as previous commercial treatments, large fires, and non-commercial (TSI) treatment. Overlap between private and state land buffers was also omitted from this calculation. The total acreage request for mechanical treatment opportunity adjacent to private and state land amounts to 55,107 acres.

Additionally, it is recognized that most of these stippled areas are within current roadless areas and the feasibility of harvest activities can be limiting. These lands however, border adjacent private and state lands that do have access and many of the requested roadless area buffer contain existing US Forest Service roads that could prevent the need for additional road construction/reconstruction, which is currently not permitted within roadless areas. Thus having the opportunity to conduct treatments on US Forest Service lands within the identified buffer can be successfully implemented to mitigate future threats to the identified state and private lands.

We have attached several maps that identify the stippled buffer areas bordering private and state lands, along with additional maps that show fire behavior driven by fuels for both the Sierra Madre and Snowy Ranges. We are also happy to provide the GIS Shapefiles and associated data that was used to support our request. The Wyoming State Forestry Division will also plan to provide letters of support to supplement our request and highlight the need for treatment opportunity in the stippled buffer areas on private and state lands.

We hope that you find this rationale adequate for justification for the opportunity to treat the identified stippled buffer areas adjacent to private and state lands. The ability to conduct these treatments are imperative in helping these land managers to reach their management goals, provide for healthy forests and the associated benefits and allow for increased safety and protection of these valuable assets for current and future generations. Please feel free to contact us if there are any additional questions to this request.

Sincerely,

Carson Engelskirger

ECOLOGY LETTERS

Ecology Letters, (2018) **21**: 243–252 doi: 10.1111/ele.12889

LETTER

Evidence for declining forest resilience to wildfires under climate change

Camille S. Stevens-Rumann,[1,2]*
Kerry B. Kemp,[3] Philip E. Higuera,[4]
Brian J. Harvey,[5]
Monica T. Rother,[6,7]
Daniel C. Donato,[5,8]
Penelope Morgan[1] and
Thomas T. Veblen[6]

Abstract

Forest resilience to climate change is a global concern given the potential effects of increased disturbance activity, warming temperatures and increased moisture stress on plants. We used a multi-regional dataset of 1485 sites across 52 wildfires from the US Rocky Mountains to ask if and how changing climate over the last several decades impacted post-fire tree regeneration, a key indicator of forest resilience. Results highlight significant decreases in tree regeneration in the 21st century. Annual moisture deficits were significantly greater from 2000 to 2015 as compared to 1985–1999, suggesting increasingly unfavourable post-fire growing conditions, corresponding to significantly lower seedling densities and increased regeneration failure. Dry forests that already occur at the edge of their climatic tolerance are most prone to conversion to non-forests after wildfires. Major climate-induced reduction in forest density and extent has important consequences for a myriad of ecosystem services now and in the future.

Keywords

Climate change, forest recovery, forest resilience, tree regeneration, wildfire.

Ecology Letters (2018) **21**: 243–252

INTRODUCTION

Increased wildfire activity, in combination with global increases in temperature, drought and extreme weather (Jolly *et al*. 2015; Intergovernmental Panel on Climate Change 2016; Bowman *et al*. 2017) raise uncertainties about subsequent ecosystem responses (Turner 2010; Millar & Stephenson 2015). Forest resilience, or the capacity of a forest to return to a pre-disturbance state (Gunderson 2000), is strongly dependent on sufficient tree regeneration (Johnstone *et al*. 2016). Because temperature and drought stress disproportionally impact trees in their youngest life stages (seedlings and saplings) (Bell *et al*. 2014; Dobrowski *et al*. 2015), forest resilience to disturbances under warming climatic conditions remains highly uncertain.

Disturbance events, including wildfires, break the 'inertia' of existing communities and, under scenarios of climate change, allow for the development of new assemblages better suited to post-disturbance conditions (Donato *et al*. 2016). For example, interactions between wildfire and post-fire drought may decrease forest resilience through reduced conifer tree regeneration, potentially resulting in forest ecosystem conversion to persistent alternate shrub or grassland states or different tree species assemblages (Lenihan *et al*. 2008; Enright *et al*. 2015). Shifts in tree species distributions are expected with climate change (Allen *et al*. 2010; Petrie *et al*. 2017), particularly at the warmer, drier edge of species' ranges, and recent studies suggest that fire may be catalysing these changes throughout the Rocky Mountains and beyond (Donato *et al*. 2016; Rother & Veblen 2016; Welch *et al*. 2016).

Increased fire activity in the western US and in the US Northern Rockies has been driven by both rising temperatures and widespread drought, particularly since 2000 (Abatzoglou & Williams 2016; Westerling 2016; Fig. 1d). As temperatures continue to warm, regionally and globally, climate may become the dominant control on tree regeneration (Bell *et al*. 2014; Enright *et al*. 2015), resulting in regional changes in forest composition and extent. If suitable climate for post-fire tree recruitment is becoming increasingly rare, we expect the influence of climate to become increasingly important, relative to other factors limiting regeneration (e.g. seed availability, burn severity and competing vegetation).

Here, we conducted a meta-analysis of field measurements from 1485 sites that burned in 52 wildfires between 1988 and 2011 in temperate conifer forests of the US Rocky Mountains (Fig. 1a). We combined data on tree seedling presence and density from multiple recently published papers (Harvey *et al*. 2013; Wells 2013; Stevens-Rumann *et al*. 2014; Harvey *et al*. 2014a,b; Harvey *et al*. 2015; Morgan *et al*. 2015; Rother & Veblen 2016; Harvey *et al*. 2016; Kemp *et al*. 2016; Stevens-

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[2]*Colorado State University, Fort Collins, Colorado, USA*
[3]*The Nature Conservancy, Prairie, Oregon, USA*
[4]*Department of Ecosystem and Conservation Sciences, University of Montana, Missoula, Montana, USA*
[5]*School of Environmental and Forest Sciences, University of Washington, Seatlle, Washington, USA*
[6]*University of Colorado, Boulder, Boulder, Colorado, USA*
[7]*Tall Timbers Research Station and Land Conservancy, Tallahassee, Florida, USA*
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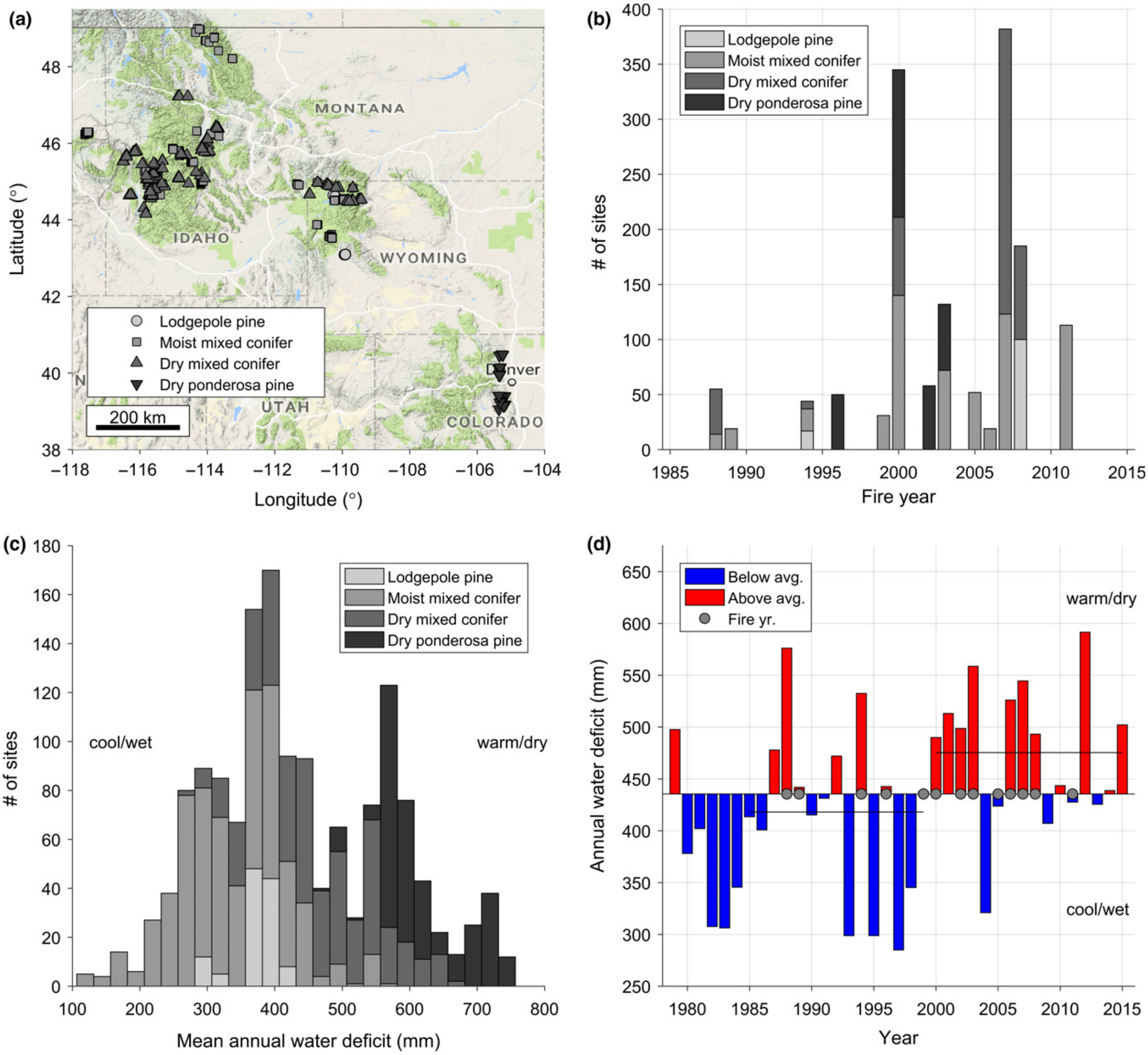

Figure 1 (a) The geographic location of sites used in this study. Black inverted triangles indicate dry ponderosa pine forests, dark grey triangles indicate dry mixed conifer forests, lighter grey squares indicate moist conifer forests, and the lightest grey circles indicate lodgepole pine forests. (b) Sites displayed by fire year and number from each fire year, with colours indicating forest type. (c) Mean annual water deficit of all sites, again coloured by forest type, with cool/wet sites on the right and warm/dry sites on the left. (d) The mean annual water deficit averaged across all sites, starting in 1979, before the period of analysis in this study (1985–2015). The black horizontal lines indicate the 1985–1999 and 2000–2015 mean values.

Rumann & Morgan 2016; Donato *et al.* 2016) with climate data to test the hypothesis that tree regeneration following wildfires is decreasing under the warmer, drier climate conditions of the 21st century. Specifically, we used this unique dataset to address three questions: (1) is there evidence of reduced tree regeneration following wildfires under the warmer, drier conditions of the 21st century compared to the cooler, wetter end of the 20th century, (2) what mechanisms are responsible for tree regeneration failures and (3) what forest types or regions are most vulnerable to forest loss due to the combined effects of wildfires and climate warming? Our results reveal how climate and climate changes strongly influences the response of forest ecosystems to disturbances, with important implications for long-term forest resilience and the ecosystem services of forested landscapes.

MATERIALS AND METHODS

Study domain

We analysed field data of tree seedling presence and density collected from 1485 sites that burned at mixed severity between 1988 and 2011, spanning a region of over 2 million km^2 and 13 degrees of latitude, and elevations from 692 to 2764 m above sea level. Within the US Rocky Mountains, sites range from Colorado to northern Idaho and Montana, with forest types ranging from low-elevation ponderosa pine (*Pinus ponderosa*) and dry conifer forests (including Douglas-fir, *Pseudotsuga menziesii,* and ponderosa pine), to moist conifer forests that include a mix of Engelmann spruce (*Picea engelmannii*), lodgepole pine (*Pinus contorta*), various fir (*Abies*) species depending on location including white fir (*A. concolor*), subalpine fir (*A. lasiocarpa*) and/or grand fir (*A. grandis*), to forests consisting of pure lodgepole pine. Additional species found in low abundance (≤ 2.5% of all seedlings) across our study sites included whitebark pine (*Pinus albicaulis*), aspen (*Populus tremuloides*) and western larch (*Larix occidentalis*). Burn severity was categorised both in the field and using satellite imagery derived relativised differenced normalised burn ratio (RdNBR). RdNBR ranged from 0 to 3907. These sites vary climatically with 30-year mean annual water deficits that range from 120 to 756 mm (Fig. 1). Due to the climatically similar conditions of moist mixed conifer and lodgepole pine sites, we combined these in our analysis, resulting in two distinct forest types for all analyses: 'dry conifer forests' and 'moist conifer forests'. We focus on this region because it is highly vulnerable to climate-induced increases in large wildfires (Dennison *et al.* 2014; Westerling 2016), and reduced post-fire tree regeneration is of particular concern (Donato *et al.* 2016; Harvey *et al.* 2016; Kemp *et al.* 2016; Rother & Veblen 2016).

Field methods and site-specific variables

Tree seedling data used in this analysis were collected on 1485 sites, ranging in size from 100 to 700 m^2, between 2010 and 2014, with methods described in detail in recent publications (Harvey *et al.* 2013; Wells 2013; Stevens-Rumann *et al.* 2014; Harvey *et al.* 2014a,b; Harvey *et al.* 2015; Rother & Veblen 2016; Kemp 2015; Harvey *et al.* 2016; Kemp *et al.* 2016; Morgan *et al.* 2015; Stevens-Rumann & Morgan 2016; Donato *et al.* 2016). All studies recorded tree seedling density by species, estimated pre-fire tree density, distance to nearest live seed source trees (m), tree mortality (%), burn severity (both RdNBR and field-verified low, moderate, or high tree mortality relative to pre-fire tree density at each site), aspect (degrees), slope (%), elevation (m) and latitude and longitude. Most studies (1183 out of 1485 sites, 80%) also estimated establishment year of seedlings based on counts of terminal bud scars. A heat load index from direct solar radiation was calculated using slope, aspect and latitude (following McCune & Keon 2002). We calculated site-specific burn severity as 100% tree mortality ('stand replacing') or < 100%. This decision was made due to varying methods of determining burn severity among the original studies. Areas that experienced post-fire harvesting or planting were excluded from the dataset.

Climate data

To quantify moisture stress for all analyses, we used water deficit, defined as the difference between actual evapotranspiration (AET) and potential evapotranspiration (PET; AET-PET, mm), although in general, our results were robust to using varying water balance metrics (i.e. ratio of AET/PET, AET or PET). Climate data from 1979 to 2015 were compiled using 800-m PRISM data (through 2009) and ancillary wind and topographically corrected solar radiation data from gridMET (4 km resolution; Abatzoglou 2013). Time series data after 2009 were generated by taking baseline PRISM data and superposing anomalies from 4-km climate layers using climatologically aided interpolation (Abatzoglou 2013). Reference evapotranspiration was calculated using the Penman–Monteith approach for a grass reference surface, and we used the water balance algorithms of Dobrowski *et al.* (2013). We created an average 30-year annual water year deficit (1985–2015) for each site (hereafter, 'average site climate'). We quantified post-fire climate by first calculating the Z-score for a site-specific time series of water deficit, and then taking the average Z-score in years 1–3 after each fire (Harvey *et al.* 2016); we termed this metric 'post-fire relative water deficit'. Using a Z-score, this index quantifies post-fire climate relative to the average climate at each site, where 0 indicates average conditions, and positive (negative) values indicate warm/dry (cool/wet) post-fire conditions. Based on the time series of water deficit across our study region, which displays an increasing moisture deficit towards present, we conducted our analyses with data stratified into two time periods: wildfires that burned before 2000 vs. during or after 2000. This date was chosen based on the dominance of drier conditions since 2000, which has been demonstrated region-wide (Fig. 1d; Abatzoglou & Williams 2016). There was a 14% increase in deficit between the 1985–1999 and 2000–2015 time periods, and no other break point in the data resulted in a larger difference in deficit.

Sensitivity analysis

Given the potential influence of time-since-fire on our results (i.e. some sites may not have had enough post-fire years to achieve the same cumulative seedling densities), we conducted analyses to account for varying times-since-fire values among sites. First, utilising the estimated age of individual seedlings from terminal bud scars, we stratified our data by year of seedling establishment to analyse if the proportion of sites exceeding recruitment thresholds between time periods was sensitive to time-since-fire. We did this first for only trees that established in the first year, then first two, then five and then 10 years post-fire, and for each iteration, we limited the entire dataset to sites with time-since-fire values that exceeded this minimum time-since-fire value. For example, for one analysis, we included only those seedlings that established within the first 5 years post-fire, and excluded all sites where time-since-fire was less than 5 years. We conducted a Pearson's Chi-squared test on the effect of 'time period' at each of these time-since-fire thresholds (Table S1).

Second, using the estimated establishment years of tree seedlings from sites in our oldest fires (1988–1994), we examined tree seedling accumulation curves for each species to estimate the point at which most tree seedlings are recruited to a site (Fig. 2). Specifically, we qualitatively assessed temporal patterns of post-fire tree seedling establishment by plotting the number of seedlings established in each year over time, as well as the cumulative seedling establishment over time. Assigning ages to conifer seedlings using bud scar counts is only accurate to within approximately 2–3 years of the true seedling age, and only for trees under 20 years of age, depending on species (Urza & Sibold 2013). As we did not perform destructive sampling to verify bud scar counts, our estimates of seedling establishment dates were used to qualitatively assess temporal patterns in post-fire establishment; we did not use estimated establishment dates quantitatively to assess differences between the two time periods (i.e. pre- and post-2000).

Statistical analyses

To examine the role of climatic and site-specific factors on seedling abundance, we developed a recruitment threshold for evaluating the likelihood that each site would eventually reach the density of the pre-burn forests. Tree seedling densities are typically highly skewed, requiring analysis methods that can accommodate non-normal distributions (e.g. Poisson, Gamma; Kemp *et al.* 2016; Harvey *et al.* 2016). Given the high variability in the seedling densities across the 1425 sites with pre-fire stand density estimates, we created a binomial response based on pre-fire tree densities at each site. We assigned each site a '1' if it had an equal or greater number of seedlings than the number of pre-fire trees, and a '0' if it had fewer, creating a binomial model for subsequent analysis. This criterion is simple and site-specific, and it does not account for (unknown) rates of seedling mortality, pre-fire tree density or age structure or whether seedlings will continue to establish. All of these factors are unknown and likely vary across sites and forest types (see Lutz & Halpern 2006). Planting guidelines or stocking rates were ruled out for the purposes of this threshold because (1) information was outdated or lacking from some National Forests, (2) 312 of our sites are managed by agencies that do not use silvicultural guidelines (e.g. National Park Service and city public lands) and (3) there is high variability in species composition and productivity across our sites, which would impact the applicability of those guidelines (Welch *et al.* 2016). Due to the high mortality typically observed in tree seedlings, and particularly in young age classes (Calvo *et al.* 2013; Larson *et al.* 2015), we used a Pearson Chi-squared test, in JMP (SAS Institute Inc. 2007), to evaluate the sensitivity of our results to different recruitment thresholds. We tested the assumption that pre-fire stand densities would be reached when seedling densities exceeded 50, 75,

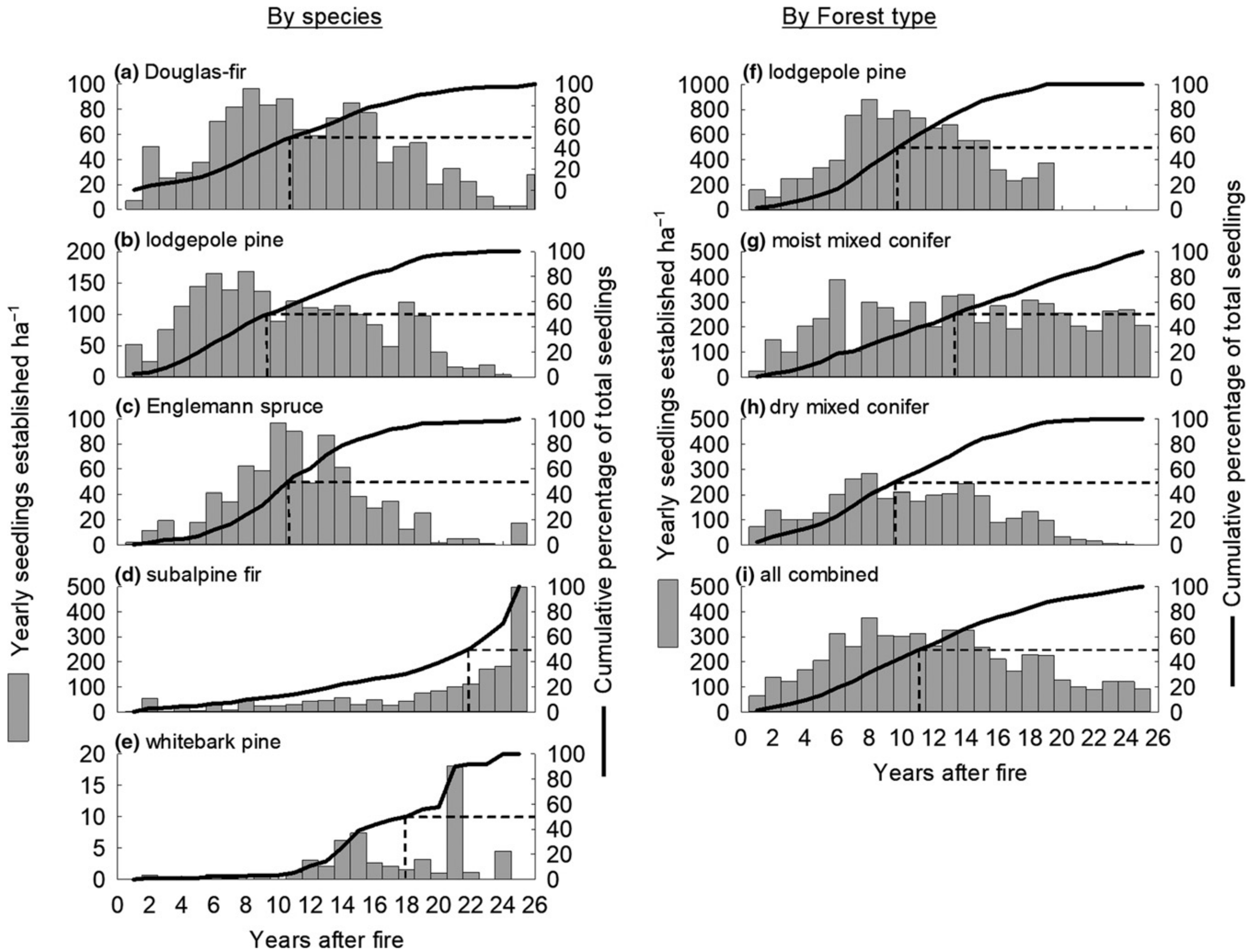

Figure 2 Tree seedling accumulation curves for each species (left column) and by forest type (right column). Data are only from fires that burned from 1988-1994 and establishment year was approximated using bud scar counts. Black dashed line indicates the time at which 50% of recruitment occurs.

Table 1 Generalised linear mixed model (GLMM) results for predicting sites achieving pre-fire tree recruitment thresholds

	Estimate	Std. Error	*Z* value	*P*
Pre-2000[1]				
(Intercept)	**−15.48**	**6.68**	**−2.317**	**0.020**
30-year water deficit	**0.018**	**0.008**	**2.354**	**0.019**
3-year post-fire deficit *Z*-score	**−15.64**	**4.23**	**−3.695**	**0.0002**
Stand-replacing fire	−0.434	0.521	−0.832	0.405
Heat load index	**15.54**	**7.22**	**2.152**	**0.031**
Minimum distance to seed source	**−0.007**	**0.003**	**−2.109**	**0.035**
30-year water deficit x 3-year post-fire deficit Z-score	**0.029**	**0.010**	**2.699**	**0.007**
Post-2000[2]				
(Intercept)	1.696	1.016	1.669	0.095
30-year water deficit	**−0.004**	**0.001**	**−3.793**	**0.0001**
3-year post-fire deficit *Z*-score	−2.024	1.101	−1.838	0.066
Stand-replacing fire	−0.120	0.181	−0.667	0.505
Heat load index	1.074	0.913	1.177	0.239
Minimum distance to seed source	**−0.001**	**0.001**	**−3.412**	**0.0006**
30-year water deficit x 3-year post-fire deficit *Z*-score	0.003	0.002	1.295	0.195

1Pre-2000 the random effect of the 7 individual fire events had a variance of 40.9 and a standard deviation of 6.4.
2Post-2000, the random effect of the 42 individual fire events had a variance of 2.7 and a standard deviation of 1.6.
Displayed are estimates, standard errors, *Z* values and *P* values for fixed effects of the GLMM on tree seedling densities achieving pre-fire tree density. Those in bold are significant at $\alpha = 0.05$

100, 125, 150 or 200% of pre-fire tree density (results in Table S2).

We fit a binomial generalised linear mixed model (GLMM) with a logit-link using the 100% recruitment threshold as our binomial response. The models were fitted using fixed effects representing average site climate (30-year average water deficit, [AET-PET, mm]), post-fire relative water deficit (3-year post-fire average water deficit, expressed as a Z-score calculated with the 1985–2015 values) and the interaction between the two, as well as site-specific effects for heat load index, burn severity (100% tree mortality vs. 0–99%) and distance to seed source (m). We set each individual fire event as a random effect to account for potential spatial autocorrelation between sites in individual fires and variability due to burning condition, and specific post-fire conditions. We performed this analysis across all fire years for sites burned prior to 2000, and sites burned during or after 2000. We considered previous disturbance, either fire or bark beetle, as a potential additional fixed effect. This factor was excluded from the final models as no sites burned before 2000 had a known previous disturbance in the past 30–50 years, and after 2000 those previous disturbances that were quantified were non-significant in the model. Analysis was conducted on the site level ($N_{total} = 1485$) and significance was assessed at the $\alpha = 0.05$ level. This analysis was performed in R version 3.2.5 (R Development Core Team 2011) with the *lme4* (Bates *et al.* 2015), *car* (Fox & Weisberg 2011) and *effects* (Fox 2003) packages. The GLMM model fit was assessed using the area under the Receiver Operating Curve (AUC), where values of 0.5 indicate a model no different from random and a value of 1.0 indicates perfect accuracy. To ensure that our sites and post-fire site conditions did not vary significantly between time periods, we conducted Pearson's Chi-squared tests, t-tests or rank sum tests (depending on conformity to normality assumptions) on all variables considered for our GLMM, grouped by time period.

To understand which forests were most vulnerable to the recent climatic changes, we examined both tree seedling presence and recruitment thresholds. For seedling presence/absence analyses, we classified presence of one or more seedlings with a '1'. We used presence/absence data in a Pearson's Chi-squared test to assess the effect of deficit, forest type and time period on seedling presence. Given the variability in plot size across forest types and studies (i.e. site size varied between 100 and 700 m^2), we did not conduct a GLMM on presence/absence data, because we believed it would bias results due to area sampled. Then, we conducted a Chi-squared analysis to determine which forest types experienced the greatest degree of change in regeneration during the two time periods analysed. We also compared the proportion of sites that met the regeneration threshold in the two forest types (dry conifer and moist conifer).

RESULTS

Tree regeneration was significantly reduced following fires that occurred in the early 21st century relative to fires that

Table 2 Results from comparisons of site-specific variables between the two time periods

Factor	Statistic	*P*	20th century	21st century
Minimum distance to seed source (m)	$\chi^2 = 0.46$	0.50	62 (100)	71 (104)
Elevation (m)	$F = 0.54$	0.46	2007 (377)	1993 (427)
Slope (degree)	$F = 10.18$	**0.0014**	21 (16)	26 (20)
Aspect (degree)	$F = 3.81$	0.06	167 (101)	183 (110)
Forest type (% of dry forest types)	$\chi^2 = 6.50$	0.08	49	52
Field-verified burn severity	$\chi^2 = 4.30$	0.23	10	15
(Categories: Low, Moderate,			22	22
high % of each)			68	63
Plot size (m^2)	$F = 0.13$	0.71	215 (14)	221 (5.6)
30-year climatology (mm)	$F = 0.57$	0.45	462 (132)	456 (120)
3-year post-fire relative water deficit (*Z*-score)	$F = 312.42$	**< 0.001**	−0.37 (0.57)	0.42 (0.45)

Depending on the variable, we conducted a Pearson's Chi-squared analysis, a rank sum test, or an ANKOVA on site-specific variables. Values in the right two columns are means (standard deviations), and those in bold indicate a significant difference between periods at $\alpha = 0.05$.

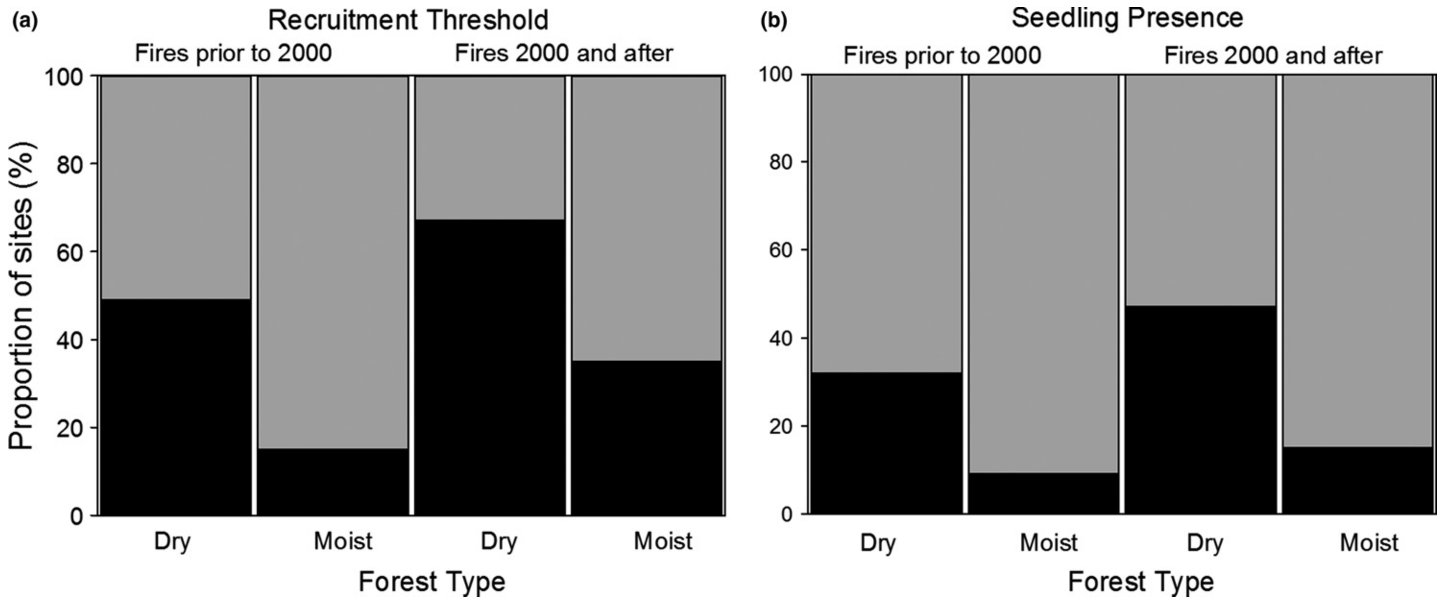

Figure 3 Displayed are the proportion of sites within each forest type [dry conifer (dry) and moist conifer (moist)] that (a) met recruitment thresholds for replacement (1; light grey) or not (0; black) and (b) had at least one conifer seedling present on a site. In both (a) and (b) we contrasted fires that occurred in the 20th century (left) and in the 21st century (right). Proportional differences between time periods (before 2000 or since 2000) were compared using a Pearson's Chi-squared test across all forest types in (a) and (b) and within dry forest and moist forests. All differences between time periods were significant ($\chi^2 > 7.4$, $P < 0.001$**)**. [Correction added on 18 January 2018, after first online publication: the Figure 3 has been corrected]

occurred in the late 20th century. For sites burned at the end of the 20th century vs. the first decade of the 21st century, the proportion of sites meeting or exceeding pre-fire tree densities (e.g. recruitment threshold of 100%) decreased by nearly half (from 70 to 46%) and the percentage of sites experiencing no post-fire tree regeneration nearly doubled (from 19 to 32%; $\chi^2 > 15$, $P < 0.001$, Figs 3 and 4d).

Average site climate and distance to seed source were the two significant predictors of whether site-level seedlings densities exceeded recruitment thresholds needed to achieve pre-fire tree densities across both time periods (GLMM, Table 1). In addition to site-level characteristics (e.g. distance to seed source, heat load index and burn severity), average site climate, post-fire relative water deficit and the interaction between these two climate variables were significant drivers of seedling densities in areas burned prior to 2000. In contrast, for fires in the 21st century, post-fire relative water deficit and heat load index were no longer statistically significant predictors of post-fire tree regeneration. During this later period, tree regeneration was influenced only by average site climate and distance to seed source (Table 1). Overall, our models explain a significant portion of the variability in the post-fire recruitment threshold (pre-2000 GLMM AUC = 0.91; post-2000 GLMM AUC = 0.86). The random variables of fire event was included in the model pre-2000, as it reduced the AIC value from 204.4 to 180.6, and it increased GLMM AUC from 0.79 to 0.91. Post-2000 similar differences were detected in the model with the inclusion of the random effect, with AIC value decrease from 1554.0 to 1284.0 and GLMM AUC increase from 0.71 to 0.86.

Prior to 2000, post-fire relative water deficit had a negative effect on recruitment thresholds and heat load index had a positive effect. The interaction of post-fire relative water deficit and average site climate was observed prior to 2000, indicating that the effect of moist post-fire years more strongly influenced regeneration on wet sites compared to dry sites (Fig. S1a). However, given wide confidence intervals and small effect size, we do not interpret this interaction to be meaningful. In wildfires burned since 2000, post-fire relative water deficit was no longer a significant driver and as a result, the effect of moist post-fire years remained consistent across all average site climates (Fig. S1b). In both time periods, the effect of distance to seed source was negative. However, in contrast to the pre-2000 period, tree regeneration in wildfires that burned since 2000 was negatively related to average site climate.

Less tree regeneration occurred across all forest types in the 21st century. Among dry forest sites that burned prior to 2000, 68% had seedlings of any species present; this decreased significantly to 53% among dry forest sites that burned since 2000 (Fig. 2, $\chi^2 = 8.5$, $P = 0.004$). The proportion of dry forest sites with seedling densities exceeding recruitment thresholds was also lower after 21st-century wildfires, declining from 49% (in sites that burned prior to 2000) to 30% (in sites burned since 2000; $\chi^2 = 14.3$, $P = 0.0002$). Moist forest types exhibited a similar decline in regeneration ($\chi^2 > 7.5$, $P < 0.01$), but the proportion of sites with seedlings or densities exceeding recruitment thresholds was greater than 65% in both time periods, declining from 91 to 65%.

We tested several assumptions and potentially confounding factors in our analyses including variations in site conditions, the regeneration threshold created for our GLMM and the effect of time-since-fire on tree establishment. In our analyses of sites and post-fire site conditions between the two time periods, only slope and post-fire relative water deficit varied significantly between these periods (Table 2). Distance to seed

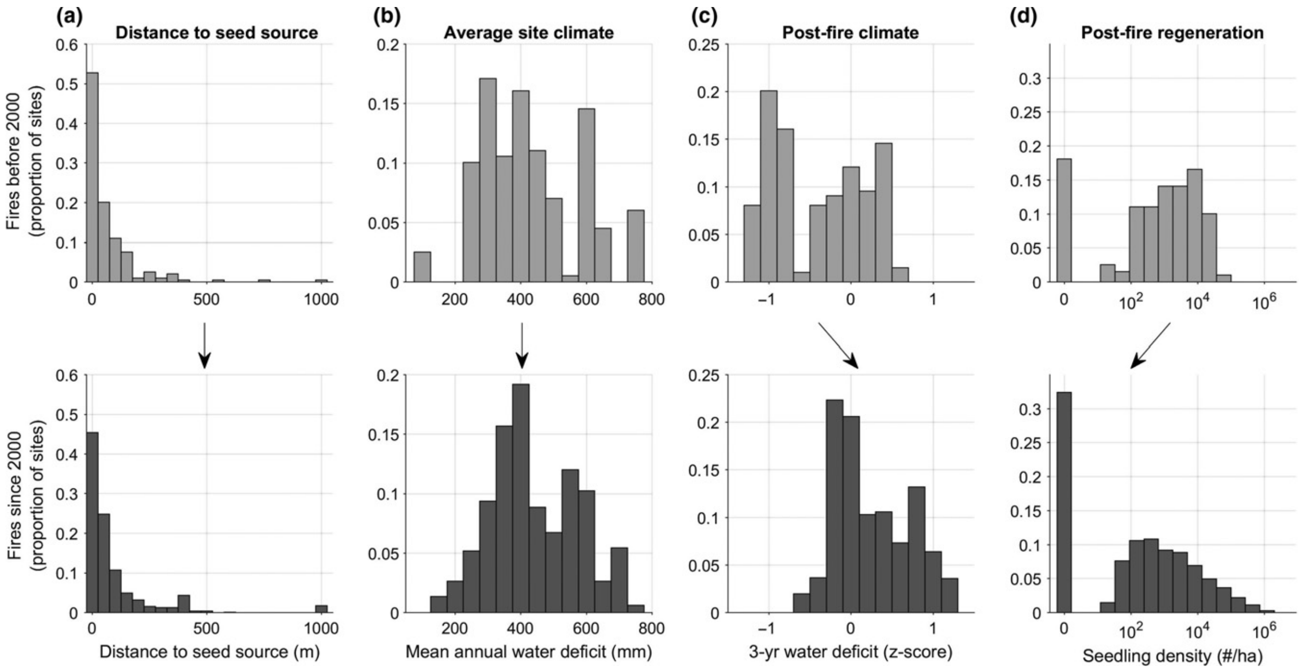

Figure 4 Displayed are site characteristics and tree seedling density from sites that burned before 2000 (light grey, top) and since 2000 (dark grey, bottom): (a) distance to seed source, (b) site climate using 30-year mean annual water deficit, (c) post-fire climate conditions using Z – scores of 3-year water deficit, and (d) post-fire regeneration as a function of seedling density. Vertical arrows indicate no general trends between time periods (before 2000 and since 2000) and diagonal arrows indicate significant directional shifts between time periods.

source, elevation, aspect, plot size, forest type and average site climate remained relatively constant across our time periods ($P > 0.05$). Sampled sites had slopes on average five degrees steeper in fires that burned in the 21st century compared to those burned in the 20th century ($F = 10.18$, $P = 0.0014$). Post-fire relative water deficit was significantly drier in the 21st compared to the end of the 20th century ($F = 312.42$, $P < 0.0001$, Fig. 4). Changing the regeneration threshold (i.e. from 50 to 200% of pre-fire stand density) did not change the significance of our results, and the majority of sites remained either below or above the threshold regardless of these changes (Table S2).

Our results were robust to the effects of varying time-since-fire, demonstrated by our analyses on seedling age and seedling establishment patterns. Regardless of time-since-fire establishment window, 1–10 years post-fire, the wildfires in the 21st century had significantly fewer sites with seedlings and significantly fewer sites meeting the recruitment threshold (Table S1). Across our oldest sites (fires from 1988 to 1994), seedling establishment in the first 3 years was highly predictive ($r^2 = 0.76$, Fig. S2) of tree densities 19–23 years post-fire, which is consistent with other studies within the region (Donato *et al*. 2016; Turner *et al*. 2016). Additionally, greater than 50% of tree seedling establishment across all species occurred within the first 10 years (Fig. 2). This was true for most of the dominant species we were able to assess, including lodgepole pine, Englemann spruce and Douglas-fir. However, this was not true for the more shade-tolerant species that were less abundant across all our sites, including whitebark pine and subalpine fir which will likely continue to establish for many decades post-fire.

DISCUSSION

Significantly less tree regeneration is occurring after wildfires in the start of 21st century compared to the end of the 20th century, and key drivers of this change were warmer and drier mean climatic conditions. Our findings demonstrate the increased vulnerability of both dry and moist forests to climate-induced regeneration failures following wildfires. The lack of regeneration indicates either substantially longer periods of forest recovery to pre-fire tree densities, or potential shifts to lower density forests or non-forest cover types after 21st-century wildfires (Millar & Stephenson 2015).

Trends of increasing temperature and associated water stress suggest that post-fire windows with suitable climate for tree seedling establishment and survival will occur less frequently in upcoming decades. Annual climate conditions have become warmer and drier throughout our study period (Fig. 1d), and it is likely that this shift is at least partially responsible for the observed decreases in tree regeneration (e.g. Little *et al*. 1994; Gray & Spies 1997; Savage *et al*. 2013; Rother *et al*. 2015). Our findings are not an artefact of varying characteristics of sites that burned before or since 2000, as forest type, burn severity, topography, mean distance to seed source and average site climates did not vary significantly between sites that burned during these two time periods (Table 2, Fig. 4). Although slope was significantly steeper at sites burned in the 21st century, the mean slope increase of five degrees is likely not ecologically meaningful. In contrast, post-fire water deficits increased from an average of -0.37 standard deviations below the mean to 0.25 standard deviations above the mean (Z-scores, relative to 1985–2015 average site climates), a trend that is consistent with regional and global warming documented since the 1970s (Mote & Salathe 2010; Fig. 1d mean lines). The absence of any cool/wet 3-year post-fire periods (i.e. water deficits more than 0.6 standard deviations below average; Fig. 4c) may explain why this variable was no longer a significant predictor of post-fire tree regeneration in the 21st century. However, the observed reductions in tree regeneration may also be attributable to other factors not assessed here, including the impacts of forest pests and pathogens, declining abundance of moisture-sensitive fungal symbionts or changes to other species i (Brown & Vellend 2014).

Distance to seed source and average site climate were the only two variables consistent across time periods in significantly predicting post-fire regeneration across our broad study region. These results are consistent with previous studies conducted at finer spatial scales and across fewer fires (Donato *et al.* 2009; Haire & McGarigal 2010; Harvey *et al.* 2016; Kemp *et al.* 2016), highlighting the importance of seed availability and climate in influencing post-fire seedling recruitment across broad spatial extents.

Our results further suggest that drivers of post-fire tree seedling occurrence and density changed from the 20th century to the 21st century, especially as climate in our study region became significantly warmer and drier than in prior decades (Fig. 1d). Tree regeneration following wildfires that burned prior to 2000 was greater at warmer, driers sites, but facilitated by post-fire periods with cooler, wetter annual climate conditions. The negative relationship between tree regeneration and average site climate in wildfires burned since 2000 indicate more favourable conditions for regeneration at sites that are on average cooler and/or wetter. This negative relationship demonstrates the potential increased vulnerability and lack of resilience on hotter and drier sites, or of dry forest species, to climate warming (e.g. Johnstone *et al.* 2016; Rother & Veblen 2016). The lack of importance of post-fire relative water deficit and heat load index is consistent with our expectation of warming overriding other controls of post-fire tree regeneration under directional climate warming, wherein windows of cooler, wetter conditions either no longer occur or are not sufficient to facilitate regeneration to pre-fire levels.

Our 23-year-study period is short compared to the time span of ecological succession in these ecosystems, and the longer term successional trajectories of these study sites are ultimately unknown. Particularly for sites that burned in the 21st century, sampling took place less than 15 years after wildfires, raising the possibility that recent lower tree regeneration could be an artefact of short post-fire sampling windows. However, two factors suggest this is unlikely. First, our sensitivity analysis of our recruitment thresholds (50–200% of pre-fire tree densities, Table S2) demonstrates that most sites either have an abundance of seedlings or close to none, with very few with seedling densities near the recruitment thresholds. For example, across fires that burned in the 20th century, 70% of sites that did not meet the recruitment threshold by 2 years post-fire (based on seedling age) also did not meet the recruitment threshold 10 years post-fire. Second, seedlings abundance or lack thereof in the first 2–3 years was highly predictive of long-term establishment trends. Due to the limited observed time since fire, especially for wildfires since 2000, we cannot state conclusively if sites with few or no tree seedlings are simply experiencing a delay in regeneration and will ultimately be forested, or if we are observing a more permanent shift to non-forested cover types. Tree seedlings may establish in response to short-term anomalous wetter periods in the future, but our results highlight that such conditions have become significantly less common since 2000, and they are expected to be less likely in the future (Enright *et al.* 2015). Further, persistent or long-lasting vegetation changes following wildfires have been observed worldwide, including North American boreal forests (Johnstone & Chapin 2006), temperate forests of New Zealand and southern South America (Kitzberger *et al.* 2016) and temperate rainforests in Tasmania (Holz *et al.* 2015).

Climate drives changes in ecosystem recovery after fire

Climate change is already affecting multiple ecosystem properties, leading to shifts in species composition and state changes (Walther *et al.* 2002; Donato *et al.* 2016). In the US Rocky Mountains, we documented a significant trend of reduced post-fire tree regeneration, even over the relatively short period of 23 years covered in this analysis. Our findings are consistent with the expectation of reduced resilience of forest ecosystems to the combined impacts of climate warming and wildfire activity. Our results suggest that predicted shifts from forest to non-forested vegetation (e.g. Bell *et al.* 2014) may be underway, expedited by fire disturbances (Kemp 2015; Donato *et al.* 2016; Harvey *et al.* 2016; Johnstone *et al.* 2016; Rother & Veblen 2016).

Regeneration failures, as measured by both seedling presence/absence and regeneration thresholds, occurred across all forest types (Figs 3 and 4d). Low-elevation forests, dominated by tree species near the warm, dry edge of their climatic tolerance may be particularly vulnerable to shifts to non-forest vegetation, because of the absence of any tree species that could reestablish under warmer, drier conditions (Harvey *et al.* 2016). Meanwhile, moist forest types may experience a shift in species dominance and a decrease in tree density. And while only 15% of the moist forest sites we studied lacked seedling after 21st-century fires, 35% of these sites did not meet the recruitment threshold. This represents a substantial increase (300%) relative to the 1985–1999 period, highlighting the impacts of warming in moist forests as well. Thus, unlike the potential transition from forest to non-forested cover types in low elevation, dry forests, moist forests may be more likely to experience a shift in forest structure or changes in species composition. Our study demonstrates that short post-fire periods of wetter climate that have favoured tree regeneration in the past may not occur frequently enough to facilitate tree regeneration in the future, across a broad region and multiple forest types in the Rocky Mountains. As scientists, managers and the public aim to understand and plan for increasing fire activity, our results suggest a high likelihood that future wildfires will facilitate shifts to lower density forest or non-forested states under a warming climate.

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AUTHOR CONTRIBUTIONS

CSSR is a CO-PI on the primary funding source, and she also collected and compiled field data, wrote the manuscript, organised meetings among all co-authors and conducted analyses. KBK is a CO-PI on the primary funding source, and she also collected and compiled field data, conducted analyses and contributed to manuscript editing and manuscript preparation. PEH compiled climate data, conducted analyses and contributed to manuscript editing. He also obtained funding for one of the initial data collection efforts. BJH collected and compiled field data, conducted background analyses and contributed to manuscript editing and manuscript preparation. MTR collected and compiled field data, contributed to manuscript editing and manuscript preparation. DCD collected and compiled field data contributed to manuscript editing and manuscript preparation. PM is the PI on the primary funding source for this project, and also obtained funding for several of the initial data collection efforts. PM also compiled field data and contributed to manuscript preparation. TTV contributed to manuscript editing and manuscript preparation, and obtained funding for one of the initial data collection efforts.

DATA ACCESSIBILITY STATEMENT

All data will be publicly available via archives of the Rocky Mountain Research Station with links from Fire Research and Management Exchange System (FRAMES; www.frames.gov).

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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