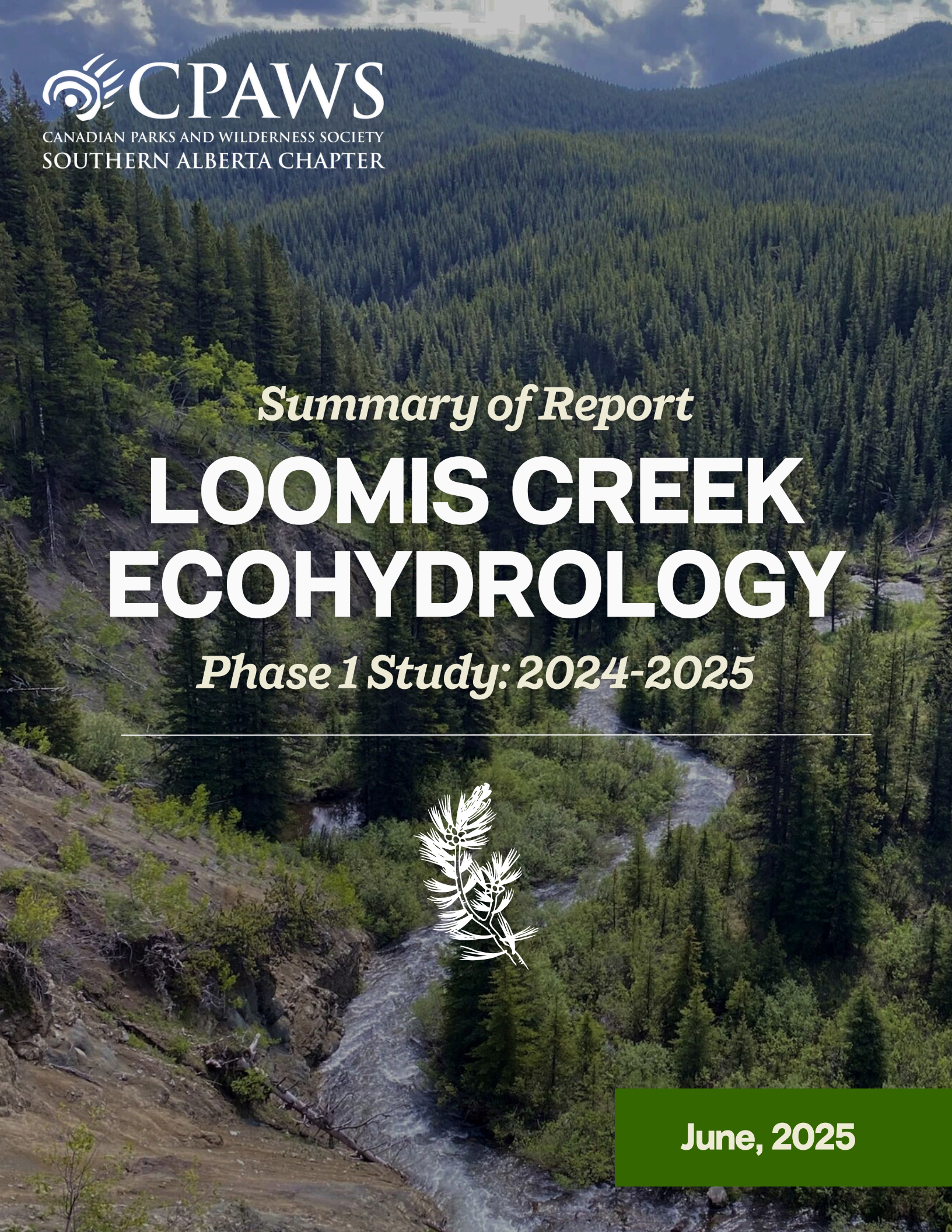

CPAWS
CANADIAN PARKS AND WILDERNESS SOCIETY
SOUTHERN ALBERTA CHAPTER

Summary of Report

LOOMIS CREEK ECOHYDROLOGY

Phase 1 Study: 2024-2025

June, 2025

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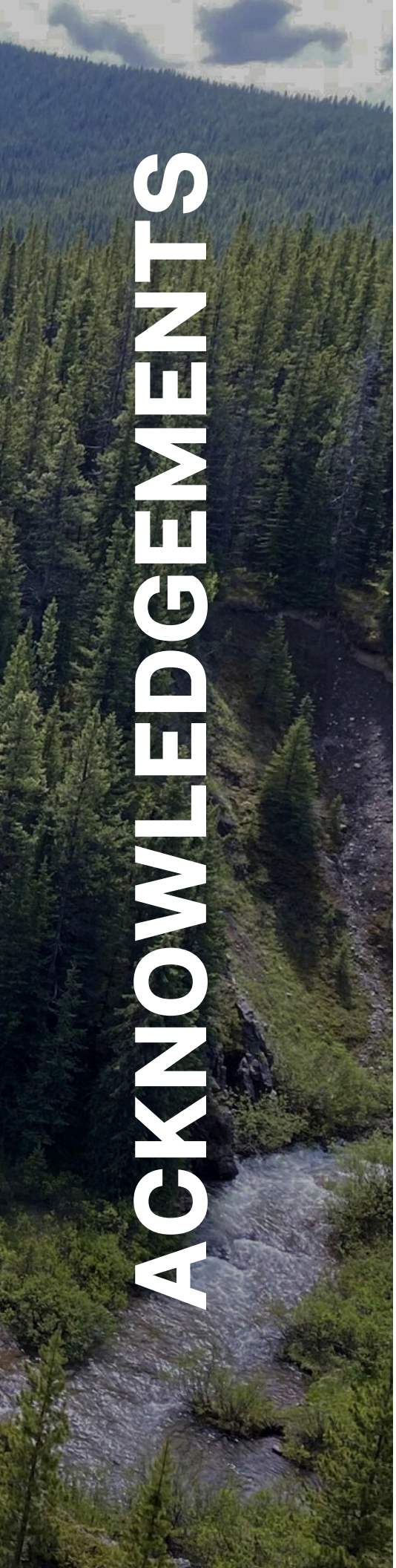

ACKNOWLEDGEMENTS

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Full technical report available here.

Online map of fieldwork sampling locations and observations available here.

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Finally, a particular thank you goes to all those members of the public who generously supported this project through donations, and the Bow River Trout Foundation for matching donations from Foundation members. Without this support, this project would not have been possible.

Introduction

Canadian Parks and Wilderness Society (CPAWS) Southern Alberta Chapter

The Canadian Parks and Wilderness Society (CPAWS) Southern Alberta Chapter is a non-profit conservation organization that has been working since 1967 to promote thriving, healthy, and diverse lands and waters in Alberta. We have long been engaged in land-use planning and sustainable forest management with a focus on promoting science-driven solutions that address cumulative effects and achieve sustainable ecosystem-based management.

In 2023, CPAWS learned of the upcoming clearcut logging of approximately 12.5 km² by West Fraser Cochrane, within the Highwood River and Loomis Creek watersheds in Kananaskis Country, Alberta.

The plan involves constructing roads over watercourses that are legally designated as critical habitat for bull trout (Salvelinus confluentus) under the Species at Risk Act (SARA).

Roads and crossings can lead to erosion, resulting in sediment entering watercourses. Excess sediment can cause degradation of spawning areas, suffocation of eggs incubating in spawning gravel, and reduced food availability.

Water features and 30 m riparian buffers throughout the entire watershed area designated as critical habitat will be impacted. Riparian areas, the areas bordering watercourses, function to provide important hydrologic and ecological functions such as:

1. Filtering sediment from runoff and reducing erosion and stabilizing banks;

2. Providing a source of large woody debris to streams that will slow down erosion, retain sediment and larger streambed substrate, and create deeper habitat for juvenile and adult fish to feed, grow, and hide from predators;

3. Providing a source of nutrients and food (e.g., insects) for fish; and

4. Providing shade which moderates water temperature.

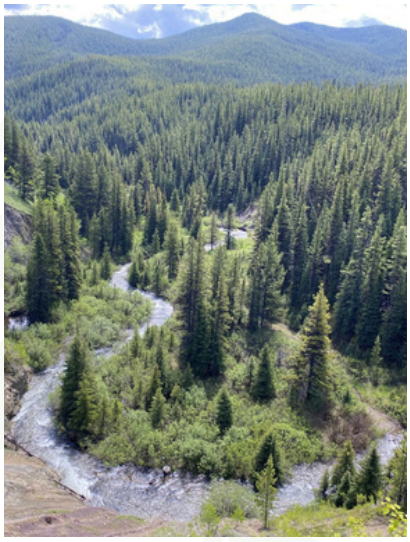
Project Timeline

2023

In 2023, we commissioned an environmental DNA (eDNA) survey, supported by the Bow River Trout Foundation, which detected bull trout DNA, consistent with historical records of presence in Loomis Creek.

2024

Following this, in 2024, we put out a call for funding to support a field assessment of stream channels, riparian areas, and bull trout distribution and spawning in the Loomis Creek watershed. We retained Fintegrate Fisheries & Watershed Consulting Ltd. to carry out this work. We also obtained support from other experts in hydrology and fish biology.



2025

This summary report is an overview of the full technical report, which presents the results of the ecohydrology work that was completed in 2024.

Full technical report available here.

An online map collating the sampling locations and observations from the fieldwork was also created.

Online map available here.

We continue to advocate for the protection of native trout species habitat in the region.

Overview

Canadian Parks and Wilderness Society (CPAWS) engaged consultants to conduct an eco-hydrological field assessment of a recently approved clearcut logging plan in the Loomis Creek watershed, which drains into the upper Highwood River.

The Highwood River is home to a threatened population of bull trout, with the upper Highwood watershed serving as the principle spawning area. The extent of the logging plan is large (~12.5 km^2), and if implemented, based on hydrologic modelling completed for Alberta Forestry and Parks, is predicted to result in both average and peak flows on Loomis Creek increasing by approximately 10%, with earlier and more rapid spring runoff. These changes will result in erosion and sedimentation, damaging stream channels and reducing water quality.

Bull trout at redd.

Redd with spawning.

Field assessment of bull trout distribution and habitat use in Loomis Creek has confirmed that it is home to a previously undocumented resident population that is isolated from the Highwood River. The downstream portion of a low gradient mid-section of the stream (referred to in the technical report as “the beaver meadows” and shown in the map on page 8) is the only habitat where spawning and young of the year rearing were observed (young of the year are juveniles that hatched that year). This mid-section of stream has the highest habitat quality but is also most vulnerable to impacts of the planned logging.

Planned roads, water crossings, and clearcuts were found within as little as 10 m upslope and upstream of the most sensitive critical habitat in the watershed where bull trout spawn, eggs incubate over the winter, and juveniles rear.

Logging will directly damage or destroy critical habitat, and the plan does not follow all the riparian buffer requirements of the provincial Operating Ground Rules (OGRs) or the federal Species at Risk Act (SARA) recovery strategy. Even if it did, this field assessment together with the earlier hydrologic modelling completed for Alberta Forestry and Parks, show that these regulatory requirements are insufficient to prevent hydrologic changes that will impact bull trout habitat.

Location where a cut block boundary and planned road overlap the historical road and are within 10 m upslope from Loomis Creek where two bull trout redds were observed.

Historical wildfire in 1936 and selective logging starting in the 1940s in the Loomis Creek watershed did not affect the most hydrologically reactive headwaters, but the planned clearcuts, disproportionately on south facing slopes, will.

The above-mentioned desktop assessment showed hydrologic recovery of the forest after historical logging has been slow, even though large areas were not clearcut. It indicates that higher and more rapid increases in flows resulting from the planned logging could damage or destroy critical habitat, with disturbance to stream channels persisting for 50 years or more. With reduced spawning and rearing success and a generation time of only seven years, this could lead to decreased bull trout productivity (growth, survival, recruitment), putting the Loomis Creek population at risk of declining fish abundance or total extirpation.

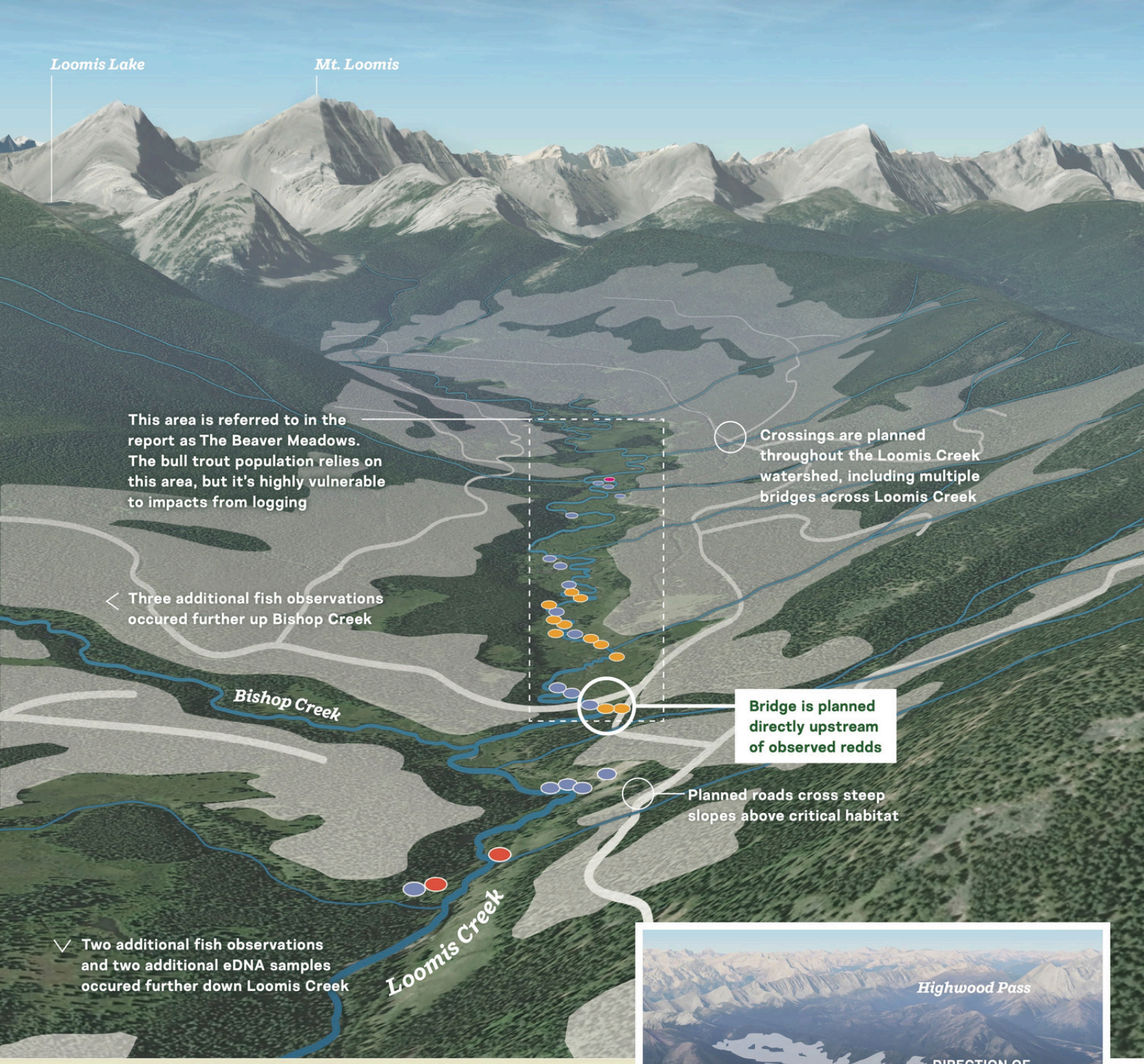
Currently, neither government nor the forestry sector are required to conduct the type of field-based assessment CPAWS has commissioned, even when there is designated SARA-listed critical habitat overlapping or downstream of a clearcut logging plan.

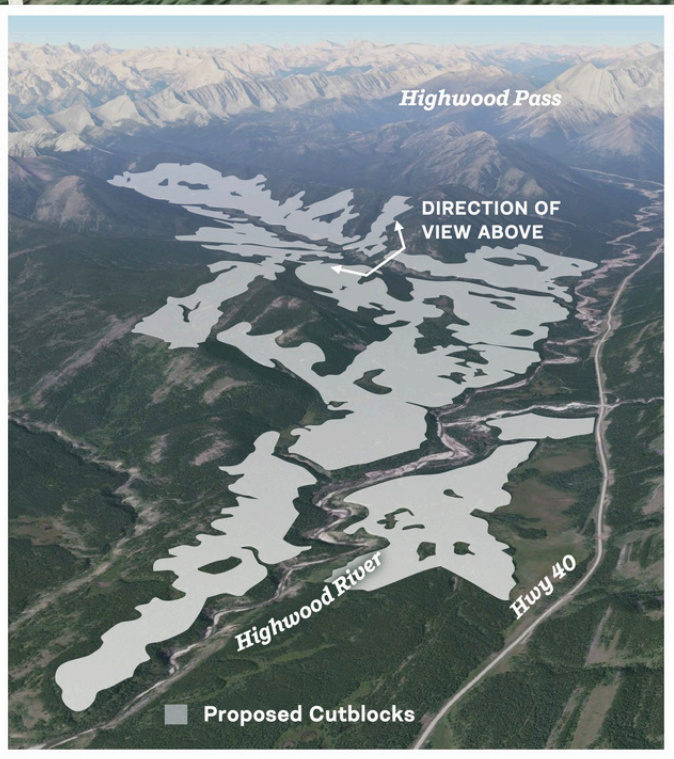
This lack of requirements for prior field-based assessments makes it impossible to adequately assess the effects of industrial logging on these species and allows undocumented degradation of critical habitat to continue.

This field-based watershed assessment, together with the earlier hydrologic modelling, demonstrate the higher levels of detailed review required to evaluate the risks of clearcut logging disturbing processes that native trout are dependent on. Current stream channel conditions, watershed disturbance history, and native trout distribution and habitat use must be documented. Predicted changes to underlying watershed processes resulting from changes to land cover must be evaluated with desktop modelling of hydrologic impacts.

A pair of bull trout spawning in Loomis Creek, male on right.

SARA prohibits killing or harming native trout or damaging or destroying designated critical habitat, yet methods for evaluating the risk of this resulting from clearcut logging in watersheds where these species are present are lacking. Detailed assessments like those conducted for the Loomis Creek watershed are necessary to identify likely impacts to the critical habitat that native trout depend on and determine whether logging is appropriate in these areas.





Timber Harvest in the Upper Highwood

This study confirmed for the first time that Loomis Creek is occupied by a resident bull trout population. The impacts from proposed logging, roads, and crossings on habitat represent a high risk to the sustainability of the population.

Loomis Creek Bull Trout

A population entirely dependent on watershed processes

Small stream-resident bull trout populations are rare. The Loomis Creek population would not exist without the unique geospatial, geologic, hydrologic, and stream channel morphometric characteristics of the watershed. These cumulatively create a small patch of habitat where a population can persist, isolated from immigration from the larger Highwood River population by a steep channel gradient with forced steps (log jams) preventing upstream movement. Bull trout have very specific habitat requirements, and for this reason in watersheds of similar size as the Highwood River across the Eastern Slopes, the species is not as commonly found in small streams as other trout species like westslope cutthroat trout (Oncorhynchus lewisi) and rainbow trout (O. mykiss).

Low gradient, mid reach of Loomis Creek within the beaver meadows.

Redd with spawning.

Forced step on lower Loomis Creek is a 1 m high barrier to upstream fish passage.

With only two historical records of bull trout in the Loomis Creek watershed (the most recent one over 15 years old), the Project used the eDNA method to efficiently collect evidence showing that the species was overwintering near the downstream limit of the beaver meadows in late November 2023. In 2024, additional use of this method as well as direct observations highlighted that bull trout are distributed throughout most of Loomis Creek and its largest tributary, Bishop Creek, further upstream than previous records indicated and in areas where logging is planned.

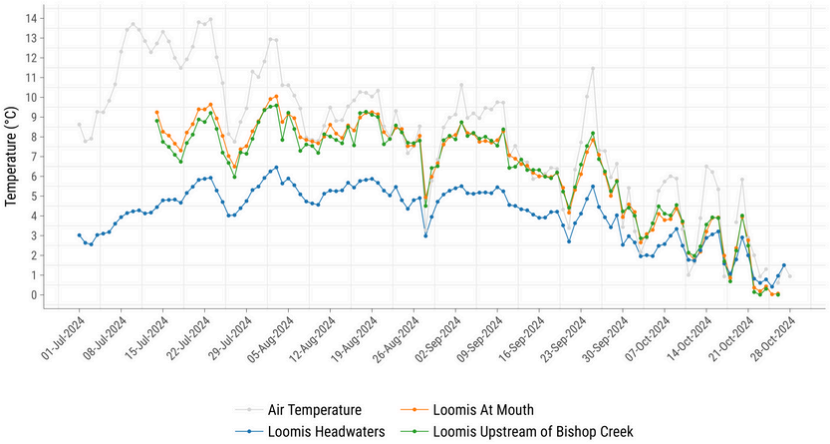
Bull trout require cold, clean, complex, and connected habitats, and are considered an indicator of watershed health and integrity.

This section of the summary report reviews some key habitat requirements that bull trout have and how the field assessment demonstrates that the Loomis Creek watershed supports these requirements. It also highlights how the planned clearcut logging could disturb the processes necessary to create suitable bull trout habitat.

Cold Stable Flows

Bull trout require colder water temperatures than other native trout species, and locally in southern Alberta the coldest streams have the highest juvenile abundance. Streams that do not support the species typically average over 14°C in August, while the reach of stream where bull trout spawn in Loomis Creek averaged 8°C in August.

During the summer, Loomis Creek was coldest in the headwaters, while in late fall the headwaters became slightly warmer than the rest of the creek, possibly due to some groundwater inputs which are warmer than surface flows in winter.



Stream electrical conductivity increased over three points along the mainstem of Loomis Creek from the headwaters to the mouth, suggesting an overall gradual increase in groundwater inputs to stream flow, which has higher conductivity than snow, rain, and surface runoff. Tributaries higher in the watershed also had lower electrical conductivity than those lower in the watershed, which may reflect a transition of flows originating more from precipitation and runoff to flows where groundwater inputs are a greater contributor.

Bull trout require stable fall and winter flows for spawning and to incubate eggs over the winter without freezing. Redds are the sites in the spawning gravel that are excavated by females where fertilized eggs are deposited.

12 bull trout redds were located on Loomis Creek

in the low gradient mid reach of the stream, which was surveyed twice. This documented for the first time that there is a reproducing population in the Loomis Creek watershed. The redds were all within a 1 km reach at the downstream limit of the beaver meadows. A survey of Bishop Creek found no redds, suggesting the highest quality spawning habitat is where the redds were found on Loomis Creek.

Instantaneous flow measurements at the downstream limit of the beaver meadows where bull trout spawn were approximately twice those in the headwaters, suggesting there is significant exchange of water flowing in the channel substrate beneath the stream bed into the stream in this reach. This shallow groundwater is sometimes referred to as alluvial groundwater because it moves downstream along a creek or river. Sufficient base flows in the lower reach of the beaver meadows allow bull trout to spawn in the fall, suggesting high rates of surface to subsurface flow exchange through the loose spawning gravels keeping the incubating eggs oxygenated and preventing them from freezing over the winter.

A staff gauge was installed to continuously monitor flows at one point on Loomis Creek near the mouth and showed a gradual but substantial decline from July to October, reflecting the typical hydrologic regime of a snowmelt dominated stream.

Groundwater recharge and discharge rates are likely to change following the clearcut logging, with faster runoff and reduced shading reducing groundwater recharge, increasing evaporation, and leading to higher stream temperatures. Additional measurements of temperature, stream electrical conductivity, and flow may improve the understanding of the Loomis Creek hydrologic regime.

Loose spawning gravel and calm side channel habitat

Example of riffle-pool channel morphology in the low gradient mid reach of Loomis Creek.

Channel morphology refers to the physical attributes of the bed and banks of streams and adjacent riparian areas. Stream gradient (slope) is a key factor determining channel morphology. Bull trout require reaches of lower stream gradient to create the channel characteristics suitable for spawning and juvenile rearing. Loose spawning gravel that females can excavate to construct redds accumulates in these reaches where the erosive power of streams is lower. A recurring channel pattern develops of alternating reaches of shallow, swift, turbulent flow and deeper, slower, calmer flow. Hydrologists refer to this as riffle-pool morphology. Bull trout eggs hatch in early spring before peak flows occur, and pools provide the habitat young of the year need to feed and grow without being swept downstream.

Geospatial analysis showed that only the mid-reach of Loomis Creek has a lower stream gradient, with the beaver meadows overlapping part of this reach and bull trout spawning in just 1 km at the downstream limit of the beaver meadows.

The field assessment measured channel morphology and subwatershed characteristics at 36 sites distributed throughout the Loomis Creek watershed, and the results of this highlighted the vulnerability of the mid reach of Loomis Creek to channel disturbance resulting from hydrologic changes caused by the planned clearcut logging.

The increasing trends that were documented in this assessment in channel cross-sectional area (m2) and larger mobile streambed rocks (cm) with distance downstream from the headwaters of Loomis Creek provide a benchmark for future comparison if logging proceeds.

Sites with larger upstream drainage areas (km2), sites draining alpine areas above treeline, and sites draining subwatersheds that faced south (receiving more solar radiation), were all associated with larger stream channels (deep and/or wider) and were all moving larger rocks downstream in the streambed each year.

This result aligns with the desktop hydrologic modelling predictions that the watershed will respond to forest removal in the headwaters, with mean and peak flows increasing by approximately 10%.

It highlights how the erosive power of Loomis Creek and its tributaries already reflects the upstream drainage area (km2), forest cover, and dominant slope aspect (the direction slopes are facing), so there will be changes if the logging proceeds.

The planned clearcuts are large, located in the hydrologically reactive headwaters, and disproportionately on south facing slopes.

They will result in increased channel erosion on tributaries and the mainstem of Loomis Creek. Tributaries draining historically logged subwatersheds already show bank erosion, incisement, bedload movement, and channel aggregation and degradation. Measurements of the overall size distribution of streambed material at seven sites throughout the watershed showed that the substrate in the mid reach of Loomis Creek that bull trout are spawning in is small enough that it is already being slowly moved downstream annually under the current flow regime. Even so, within the beaver meadows, the position of Loomis Creek has remained relatively stable over the last 75 years since a 1949 air photo was taken.

However, increased flows resulting from the planned logging are likely to result in substantial change to the stream channel and loss of critical habitat.

Comparison of historical (1949) and recent (2013) imagery of a section of Loomis Creek in the beaver meadows showing channel stability over 64 years.

Spawning gravel could be embedded with sedimentation from the tributaries, or this essential gravel could be washed downstream. Calm rearing habitat could be lost as the channel is down cut and straightened due to the higher mean and peak flows result from the logging and stream meanders are cutoff and pools are infilled.

Clear water with little sedimentation from erosion

Bull trout are **adapted to clear water**, and all life stages from fertilized eggs incubating in spawning gravel to adults, are sensitive to sediment smothering respiratory membranes preventing oxygen exchange necessary for survival.

Bull trout are visual predators requiring clear water to find prey. Headwater aquatic ecosystems also rely on water clarity to allow for photosynthesis to support algal growth, the basis of the aquatic food chain.

The largest point source of sediment to Loomis Creek is an eroding bank downstream of Bishop Creek. The causes of this bank instability here are unknown but are not associated with the historical road. The eroding bank is visible on in the earliest available air photo from 1949. During a rainfall event, large inputs of fine gravel, sand, and silt were observed, and the concentration of total suspended solids increased from near zero to hundreds of mg/L. The field assessment searched for other signs of erosion and sources of sediment to Loomis Creek and its tributaries. No significant point sources that were either natural or associated with historical logging were found. Lower in the watershed, the historical logging road slumped into Loomis Creek, but erosion and sedimentation here no longer appear to be substantial.

Actively eroding escarpment on Loomis Creek near Bishop Creek during July 17, 2024, rain event.

Upstream of the confluence of Bishop and Loomis creeks no signs of fine sediment inputs were observed, and these streams remained clear during rainfall events. However, small amounts of erosion and sedimentation from the historical logging road and cattle grazing on the road were observed where it crossed tributaries to Loomis Creek.

Since bull trout spawn in Loomis Creek upstream of Bishop Creek and the most sensitive life stages rear here, and since the Project identified locations where roads, water crossings, and clearcuts are planned upslope and upstream of areas where spawning occurred, the planned logging poses a significant risk of erosion and sedimentation.

The risk is high due to the large number of locations where roads cross water and due to the increase in runoff in the subwatersheds where a large proportion of the area would be clearcut.

Logging Plans

The current assessment was based on the 2023 and 2024 Annual Operating Plans, which were available at the time. West Fraser Cochrane have since released another Annual Operating Plan for 2025, which includes changes to the logging plan. These changes have added some additional buffers for riparian areas on some streams and removed a limited amount of logging from the plan. While a step forward, these changes are insufficient to prevent the hydrologic changes outlined above and the resulting channel disturbance or protect bull trout and critical habitat.

Layout Issues

Some planned logging areas and associated access roads and crossings were visited to assess risks to bull trout critical habitat. Logging will disturb areas north and south of Loomis Creek, upstream of, and adjacent to, where bull trout spawn and juveniles rear. Specific locations where there is a high risk associated with road erosion leading to sedimentation of spawning and rearing habitat and direct damage and destruction of riparian critical habitat were identified.

Crossings

All watercourse crossings will damage and destroy riparian critical habitat and increase the risk of erosion and sedimentation. Of particular concern is a planned bridge crossing of Loomis Creek immediately upstream of bull trout spawning habitat. Redds were observed within 75 m downstream of the planned bridge and a planned road approaching the bridge is on the banks of the creek within 10 m of a point where redds and spawning bull trout were observed. The risk of erosion and sedimentation from the road and bridge is high, right at the same location where bull trout critical habitat is most sensitive. Alternative access routes, such as crossing Bishop Creek, would still destroy critical habitat and be a high risk of erosion and sedimentation.

Right: Planned Loomis Creek crossing site near the downstream limit of the beaver meadows and immediately upstream of where bull trout spawn.

Riparian Buffers

Riparian buffers for tributaries and connected water features required by the bull trout recovery strategy (30 m no logging) were not included in the original logging plan. All watercourses and water features throughout the planned logging area must be identified and this buffer applied. It is also important to recognize that the science suggests that the legally required 30 m buffers are insufficient to protect all riparian functions, and that larger buffers or in some cases watershed-scale protections are needed.

Access Roads

As noted above, the historical logging road has resulted in a landslide into Loomis Creek lower in the watershed. The location of the road for the planned logging is different but still crosses a steep groundwater saturated slope on the north side of Loomis Creek downstream of Bishop Creek.

Wetlands

Wetlands are found adjacent to planned logging areas throughout lower elevation areas of the Loomis Creek watershed without sufficient buffers applied. All wetland habitat in the area supports bull trout by storing and supplying water and nutrients to lower elevation streams.

Conclusion

The Phase 1 eco-hydrology assessment has confirmed for the first time that:

Loomis Creek is occupied by a resident bull trout population that relies heavily (if not entirely) on a lower gradient, alluvial reach of the stream in the middle of the watershed for spawning as well as young of the year rearing and overwintering. Bull trout are broadly distributed in the Loomis and Bishop creek watersheds, but spawning was only observed in a 1 km reach of Loomis Creek within the beaver meadows. Observations of young of the year upstream from this reach document rearing habitat use and suggest spawning may occur further upstream.

There is potential for direct harm or mortality of bull trout from road mass wasting or crossing failures leading to large inputs of sediment to Loomis Creek.

It is also likely that the predicted increases in flow and peak flow variability resulting from forest removal will lead to prolonged changes to instream spawning and rearing habitat quantity and quality.

With bull trout generation time typically being 7 years, the Loomis Creek population may not be able to persist through a prolonged reduction in habitat productivity or even total loss of essential spawning or rearing habitat.

Given that the population is small and that supplemental immigration from the larger Highwood River population is unlikely and given that the Species at Risk Act prohibits harming the species or damaging or destroying bull trout habitat, the logging plan represents a high risk to the sustainability of this population.

Damage or destruction of bull trout critical habitat on Loomis Creek leading to decreased population productivity (growth, survival, recruitment), puts the Loomis Creek population at risk of declining fish abundance or total extirpation. Given the long-term recovery goal within all historically occupied areas is to protect, maintain, and recover self-sustaining populations, the clearcut logging plan does not appear to represent an acceptable level of risk.

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