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Environmental Stewardship of Public Lands? The Decline of Westslope Cutthroat Trout Along the Eastern Slopes of the Rocky Mountains in Alberta

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ENVIRONMENTAL STEWARDSHIP OF PUBLIC LANDS? THE DECLINE OF WESTSLOPE CUTTHROAT TROUT ALONG THE EASTERN SLOPES OF THE ROCKY MOUNTAINS IN ALBERTA

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In a well-ordered society, presumably, the law on the books would generally correspond with observed conduct, apart from the inevitable shortfall due to human error or antisocial motivations. In environmental law, however, shortfalls are widespread at all levels of the system, for reasons that cannot simply be attributed to antisocial or deviant conduct.[1]

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1. Daniel Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297, 300 (1999).

I. INTRODUCTION

The eastern slopes of the Rocky Mountain range in the Province of Alberta hold significant environmental value, but the ecological integrity of these lands has been impaired by extensive industrial and recreational developments. Outside of the national parks situated along the continental divide,[2] Alberta manages these lands under a policy regime which provides government officials with extensive discretion to authorize dispositions under the rubric of 'multiple use'.[3] It is a misnomer to describe this policy as guidance towards environmental stewardship of public lands.

The 'multiple use' policy administered by Alberta officials is based on the premise that a landscape can support many activities concurrently, and if properly managed these activities will occur without compromising ecological integrity.[4] Under this regime, Alberta officials routinely authorize new roads, clearcuts, well sites, pipelines, mines, dams, cattle grazing, and off-road vehicle trails, which have a cumulative adverse

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2. National parks are under the jurisdiction of the Canadian federal government. See *generally*, Canada National Parks Act, S.C. 2000, c. 32 (2019). The national parks in this region are Jasper, Banff, and Waterton Lakes.

3. Kennett, S.A., et al., *In Search of Public Land Law in Alberta*, Canadian Institute of Resources Law, at 9, https://live-cirl.ucalgary.ca/sites/default/files/Occasional%20Papers/Occasional%20Paper%20%235.pdf (Jan. 1998). The multiple use policy was set out in: Alberta Government, *A Policy for Resource Management of the Eastern Slopes*, Alberta, https://open.alberta.ca/dataset/63df0041-7619-4fc9-948b-738cf108e47c/resource/6938bfdd-1316-4f84-adf7-5ed1744b3d84/download/1984-policyresourcemanagementeasternslopes.pdf (1984). The southern portion of the eastern slopes is now governed by the South Saskatchewan Regional Plan Revised May 2018, *see* online: Alberta Government, *South Saskatchewan Regional Plan*, Alberta, https://open.alberta.ca/dataset/13ccde6d-34c9-45e4-8c67-6a251225ad33/resource/e643d015-3e53-4950-99e6-beb49c71b368/download/south-saskatchewan-regional-plan-2014-2024-may-2018.pdf (May 2018). The South Saskatchewan Regional Plan provides a thorough and complete overview of applicable law and policy governing land-use decision-making along the southern portion of the eastern slopes. And while this more recent plan is a more sophisticated version of its 1984 predecessor and incorporates the language of 'sustainability', the plan continues to adhere to the 'multiple use' philosophy described here.

4. Kennett *et al.*, *Id.* at 9.

impact on the eastern slopes.[5] The promise of environmental stewardship under the 'multiple use' policy is a fallacy: environmentalists have coined the phrase 'multiple abuse.'[6]

The decline of the Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi;* WSCT) in the Alberta part of its native range aptly illustrates the environmental shortcomings of the 'multiple use' policy. WSCT, one of approximately 14 subspecies[7] of cutthroat, are native to, and were originally abundant and widespread in, the upper Missouri, upper Columbia, and headwater South Saskatchewan river drainages of Montana, Idaho, British Columbia, and Alberta, with a small part of the contiguous range in the Madison River drainage in extreme northwestern Wyoming. Disjunct populations also occur above barriers to movement in Oregon, Washington, and the upper Thompson and mid-Columbia drainages in British Columbia.[8] The distribution of WSCT populations has contracted considerably.[9] Native WSCT now occur in Alberta only as small, isolated resident subpopulations in headwater streams and a few lakes of the Bow River and Oldman River drainages along the eastern

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5. Dan Farr *et al*., *Ecological Response to Human Activities in Southwestern Alberta: Scientific Assessment and Synthesis*, Alberta Government, https://open.alberta.ca/dataset/e77ce35a-230d-4aff-9df9-e15ccb4ddf04/resource/8a3af9fe-e4ec-4914-92ae-b25774866421/download/emsdcastlesciencereviewv58final.pdf (Dec. 2017); and Dan Farr et al., *Linear Disturbances in the Livingstone Porcupine Hills of Alberta: Review of Potential Ecological Responses*, Alberta Government, https://open.alberta.ca/dataset/c157288f-ba13-47f3-8280-673e32dd83c7/resource/d84dc68a-8670-492a-a11e-791215da877f/download/livingstone-porcupine-review.pdf (June 2018).

6. Andrew Nikiforuk, *Oh Wilderness*, Alberta Views, https://albertaviews.ca/oh-wilderness/ (Oct. 1, 1998).

7. The taxonomy and systematics of western North American trout is a long and continuing problem. Here we adopt the classification of Behnke (1992) for cutthroats, accepting the subspecific designation he gave to the Westslope Cutthroat (see R.J. Behnke, *Native Trout of Western North America* American Fisheries Society Monograph 6:1-275 (1992)).

8. Behnke, *Id.*, at 8.

9. Shepard, B., *et al*., *Status and Conservation of Westslope Cutthroat Trout within the Western United States, North American Journal of Fisheries Management 25:1426–1440*, doi:10.1577/M05-004.1 (2005); Committee on the Status of Endangered Wildlife in Canada, *Westslope Cutthroat Trout (Oncorhynchus clarkii lewisi): COSEWIC Assessment and Status Report*, COSEWIC, https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/westslope-cutthroat-trout-2016.html (2016).

slopes of the Rocky Mountains (hereinafter referred to as the Alberta population of WSCT).[10]

The decline in the Alberta population of WSCT since European settlement is primarily a result of overexploitation, habitat destruction, and hybridization with introduced non-native species of *Oncorhynchus*, especially Rainbow Trout (*O. mykiss)*.[11] Of these factors, hybridization is the most dangerous and least tractable because it is irreversible, creating one hybrid form where once there were two distinct species. The closure of recreational angling has largely addressed the impacts of overexploitation (subject to losses by illegal harvesting). However, the key factor which contributes to further population losses and limits the potential for a recovery of WSCT in Alberta is habitat loss.

The story told here about the decline of the Alberta population of WSCT is certainly not an isolated one. Habitat loss is widely understood as the primary cause for the extinction crisis sweeping the planet, in which the extinction rate of vertebrates over the last century has been conservatively estimated at up to 114 times the background extinction rate.[12] The modern extinction rate for North American freshwater fishes is even higher and has been conservatively estimated at 877 times greater than the background extinction rate, with fifty-three to eighty-six North American species of fish projected to go extinct by 2050.[13]

What is noteworthy about the ongoing decline of the Alberta population of WSCT is that losses continue despite the population falling under the protection of a threatened species legal framework. In contrast to the United States where the WSCT has not qualified for status as a threatened species, in 2005 the Alberta population of WSCT was scientifically designated as threatened and is now the beneficiary of a recovery framework which is supposed to halt the losses and restore the population to sustainable numbers.

Our primary objective in this paper is to describe the recovery framework developed under Canadian law for the Alberta population of WSCT and assess its limited effectiveness. In Part II, we briefly outline

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10. *Id*; COSEWIC 2016.

11. Competition with, and possibly predation by, introduced Brook Trout (*Salvelinus fontinalis*) and Brown Trout (*Salmo trutta*), also appear to have been factors in range contraction and decline in some drainage systems.

12. Ceballos, G., P. R. Ehrlich, A. D. Barnosky, A. García, R. M. Pringle, and T. M. Palmer. 2015. Accelerated modern human–induced species losses: Entering the sixth mass extinction. Science Advances e1400253. doi:10.1126/sciadv.1400253.

13. Burkhead, N., *Extinction Rates in North American Freshwater Fishes, 1900–2010*, 62 BIOSCIENCE 798 (2012).

the native distribution and abundance of the Alberta population of WSCT, the history and causes of population decline, the measures needed for recovery to self-sustaining numbers, and the ongoing biological and ecological problems blocking recovery. In Part III we discuss the legal framework for recovering WSCT in Alberta, and we explain how the intent of that framework has been thwarted by the agencies responsible for implementing it. Missed statutory deadlines and extensive delay in the finalization of the recovery framework has significantly impaired the implementation of action necessary to protect what remains of WSCT in Alberta and facilitate recovery. The 'multiple use' policy continues to govern unabated, despite the WSCT recovery framework and clear evidence that the land-use policy is impeding the designation and protection of critical habitat for the WSCT along the eastern slopes. Our discussion of the Alberta population of WSCT complements similar work published in the United States, and we hope our critical examination of threatened species legislation in Canada provides readers with a basis upon which to consider how the governance of public lands and threatened species differs between Canada and the United States.

II. THE CONSERVATION BIOLOGY OF WESTSLOPE CUTTHROAT TROUT

A. Conservation Status

Historically, WSCT was an internationally distributed subspecies with native populations in the United States and Canada; covering lands in multiple states and provinces, extensively subdivided into hundreds of separate stocks, each with unique features contributing to the biological nature of the taxon. What follows is a brief overview of the status of WSCT in its various ranges, other than the Alberta population of WSCT which is set out in detail thereafter.[14]

14. While this paper focuses on conservation efforts in Alberta and others have examined conservation in the United States, effective conservation and recovery of WSCT will require coordination and cooperation across multiple states and provinces in both countries. One notable distinction across the jurisdictions is how each determines what constitutes a genetically-pure stock and, in particular, the extent to which the jurisdiction includes hybrids in its conservation populations.

In the United States, WSCT were historically abundant in its core watersheds in Idaho and Montana.[15] Declines in abundance and distribution are variously ascribed to habitat loss, overfishing, and hybridization, but there is little agreement as to the relative importance of each factor.[16] Climate change may play an important role in further restricting WSCT in the future.[17]

WSCT now occurs in substantially less than its original range. Estimates of the actual proportion of the historical range now occupied by genetically-pure fish vary widely, from less than 2.5 percent in Montana alone,[18] to 10 percent of the United States range for known genetically unaltered populations, to a maximum of 37 percent if 'suspected unaltered' populations are included.[19] Although some have argued to the contrary,[20] data and arguments of others are persuasive that hybridization with invasive non-native Rainbow Trout is spreading and is likely to continue to do

15. Trotter, P. C., and P. A. Bisson. 1988. History of the discovery of the Cutthroat Trout. pp. 8-12 in R. E. Gresswell, editor. Status and management of interior stocks of Cutthroat Trout. American Fisheries Society Symposium 4, Bethesda, MD 140 p.

16. McIntyre, J. D., and B. E. Rieman. 1995. Westslope Cutthroat Trout. pp. 1–15 in M. K. Young, editor. Conservation assessment for inland Cutthroat Trout. General Technical Report RM-GTR-256, US Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 61 p.

17. McIntyre and Rieman, *Id.*; MacDonald, R. J. et al., 2014. Potential future climate effects on mountain hydrology, stream temperature, and native salmonid life-history. Canadian Journal of Fisheries and Aquatic Sciences 71:189-202. doi:10.1139/cjfas-2013-0221; Muhlfeld, C. C., et al., 2017. Legacy introductions and climatic variation explain spatiotemporal patterns of invasive hybridization in a native trout. Global Change Biology 23:4663-4674. doi:10.1111/gcb.13681.

18. Liknes, G. A., and P. J. Graham. 1988. Westslope Cutthroat Trout in Montana: life history, status, and management. pp. 53–60. in R. E. Gresswell, editor. Status and management of interior stocks of Cutthroat Trout. American Fisheries Society Symposium 4.

19. Shepard, *supra* note 9, at Table 5.

20. McKelvey, K. S. et al., (2016), Patterns of hybridization among Cutthroat Trout and Rainbow Trout in northern Rocky Mountain streams. Ecology and Evolution 6:688–706. doi:10.1002/ece3.2016.6.issue-3; Young, M. K. et al (2016), Climate, demography, and zoogeography predict introgression thresholds in salmonid hybrid zones in Rocky Mountain streams. PloS One 11:e0163563. doi:10.1371/journal.pone.0163563; Young, M. K. et al (2017), Ecological segregation moderates a climactic conclusion to trout hybridization. Global Change Biology 23:5021–5023. doi:10.1111/gcb.13828.

so within the native range of WSCT in the United States.[21] WSCT is identified as sensitive or a species of special concern by federal and state authorities.[22]

In British Columbia, 78 percent of the locales sampled in the upper Kootenay system, the heart of the British Columbia population, showed evidence of hybridization with invasive Rainbow Trout, and hybridization was increasing in magnitude and distribution.[23] Only approximately 60 percent of eighty-eight sites surveyed within the British Columbia native range of WSCT held genetically-pure native populations, and more recent resurveys using more reliable methods show higher levels of hybridization in a number of systems.[24] WSCT is identified as a species of special concern in British Columbia.[25]

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21. Muhlfeld, C. C. et al., (2014). Invasive hybridization in a threatened species is accelerated by climate change. Nature Climate Change 4:620–624. doi:10.1038/nclimate2252; Kovach, R. P., et al., (2015). Dispersal and selection mediate hybridization between a native and invasive species. Proceedings of the Royal Society of London B: Biological Sciences 282:2014.2454. doi:10.1098/rspb.2014.2454; and Kovach, R. P. et al., (2017). No evidence for ecological segregation protecting native trout from invasive hybridization. Global Change Biology 23:e11-e12.. doi:10.1111/gcb.13825.

22. Budy, P. *et al*., (2019). Distribution and status of trout and char in North America. pp. 193-250 in Kershner, J. L. et al., editors. Trout and char of the world. American Fisheries Society, Bethesda, MD. xxvi+831 p. A reasonably current map of the distribution of the remaining known pure populations of WSCT in the United States is provided by Shepard, *supra* note 9.

23. Rubidge, E. M., and E. B. Taylor, (2005), An analysis of spatial and environmental factors influencing hybridization between native Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) and introduced Rainbow Trout (*O. mykiss*) in the upper Kootenay River drainage, British Columbia. Conservation Genetics 6:369–384.

24. COSEWIC 2016, *supra* note 9. It is not clear what standard is being used in British Columbia to determine degree of introgression, as there are different criteria in different parts of the source document (BCME 2014: Table 2, compared to Figure 3). What is clear is that the target ("< 10% of each population group are introgressed at levels > 1%") tolerates substantial risk that introgression will progressively affect the population groups that have been invaded by *any* hybrid individuals, because when those fish breed, every offspring is a hybrid.

25. COSEWIC 2016, *supra* note 9.

B. Alberta population of WSCT

WSCT were historically widespread and abundant in southwestern Alberta, primarily in mainstem rivers and their tributaries below barriers to upstream dispersal. Accounts prior to settlement by the Palliser Expedition of 1857 to 1860 describe two kinds of trout as being common along the eastern slopes of the Rocky Mountains in Alberta.[26] Later work by the Alberta and Saskatchewan Fisheries Commission of 1910–1911 established that the native trout of the region were Bull Trout (*Salvelinus confluentus*) and Cutthroat Trout (now known to be WSCT).[27] Historical accounts describe abundant trout populations throughout the upper Bow and Oldman drainages.[28]

From work on more intact WSCT populations elsewhere, we can be confident that many of the large-system populations existed as metapopulations, composed of numerous individual but connected stocks exhibiting a variety of life-history forms, such as stream resident, lake resident, fluvial, and adfluvial types.[29] Stream—and lake—resident forms spend their entire lives within small headwater streams or lakes, respectively; fluvial forms occupy rivers, migrating into small headwater tributaries to spawn, then returning to their home rivers; and adfluvial forms occupy lakes, migrating (sometimes over considerable distances) into headwater or tributary streams to spawn before returning to their home lakes after spawning.

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26. John Palliser, *Exploration - British North America: The journals, detailed reports, and observations relative to the exploration, by Captain Palliser, of that portion of British North America, which, in latitude, lies between the British boundary line and the height of land or watershed of the northern or frozen ocean respectively, and in longitude, between the western shore of Lake Superior and the Pacific Ocean during the years 1857, 1858, 1859, and 1860* (Eyre and Spottiswoode, 1863).

27. Sisley, E. 1911. Fish of the eastern slopes of the Rockies. Canadian Alpine Journal 3:113–116.

28. Department of the Interior, Reports of the Dominion Land Surveyors, Government of Canada, Ottawa, ON. (1874–1918).

29. McIntyre and Rieman, *supra* note 16.

Alberta's Picklejar Lake #2 population in the Highwood drainage is the only known extant lake-resident life history form.[30] Alberta adfluvial populations existed in the Spray Lakes system,[31] Lower Kananaskis Lake,[32] and likely in several other lakes, including one or more of the lakes in Waterton Lakes National Park, Lake Minnewanka, and Crowsnest Lake.[33] Fluvial life history types occurred in the Spray River system,[34] and likely in several other rivers. Resident populations occurred in almost every accessible small headwater stream throughout the Bow River and Oldman River drainage systems. Each of these separate stocks could be expected to be locally adapted,[35] were often morphologically distinct,[36] and were likely genetically distinct at least at some level.

Almost immediately after settlement began around 1885, a decline in cutthroat numbers was reported with causes primarily attributed to overfishing and substantial habitat degradation from sawmill pollution, dams, and diversions.[37] The destruction of the WSCT native stocks was slow to be recognized, and the consequences were not immediately appre-

30. Carl, L. M., and J. D. Stelfox. 1989. A meristic, morphometric and electrophoretic analysis of Cutthroat Trout, *Salmo clarkii*, from two mountain lakes in Alberta. Canadian Field-Naturalist 103:80–84.

31. Miller, R. B., and W. H. Macdonald. 1949. Preliminary biological surveys of Alberta watersheds. Alberta Lands and Forests. King's Printer for Alberta, Edmonton, AB. 139 p.

32. Miller, R. B. 1954. Effect of the Pocaterra power development on Lower Kananaskis Lake. MS report, Fish and Game Branch, Alberta Lands and Forests, Edmonton, AB. 11 p. Available from Alberta Environment and Parks, Edmonton, AB.

33. McIllrie, J. H., and M. H. White-Fraser. 1983. Fishing in southern Alberta. Excerpts from reports by the authors dated 1890, Royal Canadian Mounted Police records RG-18 volume 44, file 814, Public Archives of Canada, Ottawa, ON. Alberta History Magazine Spring:36–38.

34. Miller and Macdonald, *supra* note 31.

35. Taylor, E. B. 1991. A review of local adaptation in Salmonidae, with particular reference to Pacific and Atlantic salmon. Aquaculture 98:185–207.

36. Miller and Macdonald, *supra* note 31.

37. Whitcher, W. F. 1887. Mr. Whitcher's report. pp. 86–93. in Annual report for the year 1886. Part I. Department of the Interior, Ottawa, ON.; *See*, McIllrie and White-Fraser 1983, re 1890 *supra* note 33; Prince et al. 1912. *Dominion Alberta and Saskatchewan Fisheries Commission 1910–11 Report and Recommendations with Appendices. Government of Canada Printing Bureau, Ottawa.*

ciated by fisheries biologists. Accordingly, stock losses spread unnecessarily and what little was done to rectify problems remains poorly documented.

There is evidence that competitive species such as Brook Trout were introduced as early as the late 1880s.[38] Hybridizing species such as Rainbow Trout, which are not native in the South Saskatchewan system, were stocked at least as early as 1932 in waters managed by Alberta,[39] and probably earlier. Rainbow Trout were stocked in Banff National Park waters by 1919.[40] Since then, Rainbow Trout and numerous other non-native trout species have been stocked on top of then-existing native populations of WSCT across the native Alberta range. Many of the introduced forms are capable of hybridizing the native subspecies out of existence;[41] others outcompete them or may prey on them.

Habitat damage and destruction in watersheds holding native WSCT has contributed to the problems caused by hybridization. Fish habitats in inland waters are largely a product of their watersheds, so what happens in watersheds eventually influences the lakes and streams into which they drain.[42] The 'multiple use' policy which guides provincial officials in their land-use decision-making along the eastern slopes has led to roads, clearcuts, well sites, pipelines, mines, dams, cattle grazing, and off-road vehicle trails. Each of these developments affects water and sediment delivery to waterbodies and watercourses, thereby affecting channel structure, substrate composition, and water quality, among other things. These changes affect the quality and productivity, and therefore the carrying capacity, of lakes and streams.

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38. Whitcher, *Id.*

39. *See generally* Annual Report for the Years 1932–33, Department of Fisheries, (Government of Canada, 1933).

40. J.C Ward, *The Fishes and Their Distribution in the Mountain National Parks of Canada*, 41 (Canadian Wildlife Service for Parks Canada, Calgary, 1974).

41. *See generally* Allendorf, F. W., and R. F. Leary. 1988. Conservation and distribution of genetic variation in a polytypic species, the Cutthroat Trout. Conservation Biology 2:170–184.

42. Rawson, D. S. 1939. Some physical and chemical factors in the metabolism of lakes. pp. 9–26. in F. R. Moulton, editor. Problems of lake biology. American Association for the Advancement of Science Publication No. 10, Washington, DC.; Hynes, H. B. N. 1975. The stream and its valley. Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie 19:1–15; Lotspeich, F. B. 1980. Watersheds as the basic ecosystem: this conceptual framework provides a basis for a natural classification system. Water Resources Bulletin 16:581–586.

Development over most of the WSCT native range can be measured by the density of linear disturbance. Linear disturbance is a good proxy for overall human development, because virtually all development requires roads, and often road surrogates such as transmission lines, pipelines, cutlines, recreation trails, and skid trails. The density of linear disturbance along the eastern slopes and within the native WSCT range is high—among the highest in western North America, often reaching 2 to 5 $km \bullet km^2$, and sometimes more.[43] These linear disturbances, in combination with the activities they serve, place these watersheds and their streams at moderate to high risk of fish habitat damage as a result of increased peak flows and surface erosion,[44] channel widening and shallowing, pool infilling, and increased substrate embeddedness. Most watersheds in the southern portion of the eastern slopes have been subjected to intense industrial and recreational development for decades, suggesting damage and destruction to fish habitat in these watersheds is highly likely.[45]

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43. Sawyer, M. D., and D. W. Mayhood. 1998a. Cumulative effects analysis of land-use in the Carbondale River catchment: implications for fish management. pp. 429–444. *in* M.K. Brewin, and D. M. A. Monita, editors. Forest-fish conference: land management practices affecting aquatic ecosystems. Proceedings of the Forest-Fish Conference, May 1–4, 1996, Calgary, AB. Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, AB. Information Report NOR-X-356. xiv+533 p. http://www.fwresearch.ca/Library.html.; Sawyer, M. D., and D. W. Mayhood. 1998b. Cumulative effects of human activity in the Yellowstone to Yukon. pp. 61–63. *in* L. Willcox, B. Robinson, and A. Harvey, editors. A sense of place: issues, attitudes and resources in the Yellowstone to Yukon Ecoregion. Yellowstone to Yukon Conservation Initiative, Canmore, AB. 138 p. https://y2y.net/publications/reports; Smith, W., and R. Cheng. 2016a. Anthropogenic disturbance and intactness in the Castle; Boyer, L., and D. W. Mayhood. 2018. Erosion and suspended sediment delivery from off-highway vehicle trails & roads in the McLean Creek watershed, Alberta. Report prepared for Alberta Wilderness Association, Calgary, AB. Freshwater Research Limited Technical Report 2018/07-1 Figure 59, draft for public review, vi+96 p. https://ln2.sync.com/dl/c2311d1d0/744jprjc-dynznjaw-g4ydkc5s-67g29dsi; Farr, D., et al., 2017, *supra* note 5; Farr, D. et al., 2018, *supra* note 5.

44. Mayhood, D. W. et al., 1998. British Columbia's level 1 watershed assessment procedure as a tool for monitoring potential impacts of development on aquatic ecosystems in Canada's Rocky Mountains. pp. 677–686. *in* N. W. P. Munro, and J. H. M. Willison, editors. Linking protected areas with working landscapes conserving biodiversity. Science and Management of Protected Areas Association, Wolfville, NS. xvii + 1018 p.

45. Mayhood, D. W., M. D. Sawyer, and W. Haskins. 2004. Historical risk analysis of watershed disturbance in the southern east slopes region of Al-

Higher linear disturbance densities have been associated with reduced populations of Cutthroat Trout,[46] including WSCT.[47] Furthermore, measures of higher road densities have been associated with greater levels of introgressive hybridization in WSCT.[48] The mechanisms of road effects most likely involve increased delivery of fine and coarse sediments,

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berta, Canada, 1910–1996. pp. 23–29. *in* G. J. Scrimgeour, G. Eisler, B. McCulloch, U. Silins, and M. Monita, editors. Proceedings of the Forest Land—Fish Conference II—Ecosystem stewardship through collaboration. http://www.fwresearch.ca/Library.html; *See generally* Sawyer and Mayhood, 1998a, *supra* note 43; Mayhood, D. W. 2013. Suspended sediment in Silvester Creek and its potential effects on the Westslope Cutthroat Trout population. Prepared for Timberwolf Wilderness Society, Calgary, AB. FWR Freshwater Research Limited Technical Report 2013/07-1, 50 p. + photo appendix. doi: 10.6084/m9.figshare.11965197.v1; Erdle, H. M., and D. W. Mayhood. 2014. Anthropogenic effects on the habitat of a critical population of at-risk Westslope Cutthroat Trout assessed using simple monitoring methods. FWR Freshwater Research Limited Technical Report 2014/06-1, Calgary, AB. v+17 p. doi:10.13140/RG.2.2.27477.58088; *See* Boyer and Mayhood 2018, *supra* note 43.

46. Eaglin, G. S., and W. A. Hubert. 1993. Effects of logging and roads on substrate and trout in streams of the Medicine Bow National Forest, Wyoming. North American Journal of Fisheries Management 13:844–846.

47. Dunnigan, J. L. et al., 1998. Effects of forest management on Westslope Cutthroat Trout distribution and abundance in the Coeur d'Alene River system, Idaho, USA. pp. 471–76. *in* M. K. Brewin, and D. M. A. Monita, editors. Forest-fish conference: land management practices affecting aquatic ecosystems. Proceedings of the Forest-Fish Conference, May 1–4, 1996, Calgary, AB. Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, AB. Information Report NOR-X-356. xiv+533 p.; Huntington, C. W. 1998. Streams and salmonid assemblages within roaded and unroaded landscapes in the Clearwater River sub-basin, Idaho. pp. 413-428. *in* M. K. Brewin, and D. M. A. Monita, editors. Forest-fish conference: land management practices affecting aquatic ecosystems. Proceedings of the Forest-Fish Conference, May 1–4, 1996, Calgary, AB. Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, AB. Information Report NOR-X-356. xiv+533 p.; Valdal, E. J., and M. S. Quinn. 2010. Spatial analysis of forestry related disturbance on Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*): implications for policy and management. Applied Spatial Analysis and Policy 4:95–111. doi:10.1007/s12061-009-9045-5.

48. Hitt, N. P. et al., 2003. Spread of hybridization between native Westslope Cutthroat Trout, *Oncorhynchus clarkii lewisi*, and nonnative Rainbow Trout, *Oncorhynchus mykiss*. Canadian Journal of Fisheries and Aquatic Sciences 60:1440-1451. doi:10.1139/f03-125

increased drainage efficiency as roads act as watercourses,[49] increased magnitude (therefore more erosive) and frequency of peak flows from the clearcuts or equivalents that the roads were built to serve,[50] artificial barriers such as culverts,[51] and increased angling access. The strongest populations of WSCT are usually found in roadless and wilderness areas.[52]

Dams and diversions along the eastern slopes have had a profound impact on the distribution and abundance of the Alberta population of WSCT. This is not only because dams block movements of native species, and their operations and reservoirs disrupt critical habitat such as spawning and rearing locations, but also because fisheries managers have frequently attempted to replace losses of native fishes due to dams with nonnative fishes that proved to be invasive. A total of 19 dams currently affect the native range of the Alberta population of WSCT in the Bow River and Oldman River drainages. Dams on the upper Spray River inundated the Spray Lakes and destroyed several unique stocks of the species that were internationally renowned for providing superb angling.[53] Dams on Lake

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49. Church, M., and J. M. Ryder. 2001. Watershed processes in the southern interior of British Columbia: background to land management. pp. 1–16. *in* D. A. A. Toews, and S. Chatwin, editors. Watershed assessment in the southern interior of British Columbia. Resources Branch, British Columbia Ministry of Forests Working Paper 57/2001, Victoria, BC. http://www.for.gov.bc.ca/hfd/pubs/Docs/Wp/Wp57.htm.

50. Alila, Y., P. K. Kuraś, M. Schnorbus, and R. Hudson. 2009. Forests and floods: A new paradigm sheds light on age-old controversies. Water Resources Research 45:W08416. doi:10.1029/2008wr007207; Green, K. C., and Y. Alila. 2012. A paradigm shift in understanding and quantifying the effects of forest harvesting on floods in snow environments. Water Resources Research 48:W10503. doi:10.1029/2012WR012449; Kuraś, P. K., Y. Alila, and M. Weiler. 2012. Forest harvesting effects on the magnitude and frequency of peak flows can increase with return period. Water Resources Research 48:W01544. doi:10.1029/2011WR010705; Winkler, R., D. Spittlehouse, and S. Boon. 2017. Streamflow response to clearcut logging on British Columbia's Okanagan Plateau. Ecohydrology doi:10.1002/eco.1836.

51. *See generally* Eaglin and Hubert, *supra* note 46.

52. *See generally* McIntyre & Rieman, *supra* note 16.

53. *See generally* Miller and Macdonald, *supra* note 31; Mudry, D. R., and R. B. Green. 1976. Fishery investigations on the Spray River, Banff National Park, 1975–1976. Report prepared for Parks Canada by Bio-systems Aquatic Resource Consultants, Calgary, AB. 54 p.; Nykolaishen, S., and N. Bankes. 2012. Sacrificing fish for power: a legal history of the Spray Lakes development. Alberta Law Review 50:1–36.

Minnewanka likely contributed to the loss of at least one cutthroat population, possibly more, on the Cascade River system.[54] Native WSCT as a genetically-pure form disappeared from Lower Kananaskis Lake after Rainbow Trout, introduced into the troutless Upper Kananaskis Lake after it was dammed, escaped downstream.[55] Damming of the lower lake in 1933[56] and again in 1954 did nothing to improve prospects for native WSCT.[57] By 1962, WSCT native to the Kananaskis Valley had virtually disappeared due to habitat damage and loss from the dams, introgressive hybridization, and competition and predation arising from introductions of non-native fishes intended to improve angling.[58]

By the mid-1970s, it is apparent that Alberta fisheries biologists recognized the damaging effects of linear disturbances on habitat quality[59]

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54. Schindler, D. W., and C. J. Pacas. 1996. Cumulative effects of human activity on aquatic ecosystems in the Bow Valley of Banff National Park. Chapter 5. pp. vi+1-59. *in* J. Green, C. J. Pacas, L. Cornwell, and S. Bayley, editors. Ecological outlooks project. A cumulative effects assessment and futures outlook of the Banff Bow Valley. Prepared for the Banff Bow Valley Study, Department of Canadian Heritage, Ottawa, ON; Schindler, D. W. 2000. Aquatic problems caused by human activities in Banff National Park, Alberta, Canada. Ambio 29:401–407. doi:10.1579/0044-7447-29.7.401.

55. Vick, S. C. 1913. Classified guide to fish and their habitat in the Rocky Mountains Park. Dominion Parks Branch, Department of the Interior, Ottawa, ON. 24 p.; Rawson, D. S. 1947. Deterioration of recently established trout populations in lakes of the Canadian Rockies. Canadian Fish-Culturist 2:14–21; Rawson, D. S. 1948. Biological investigations on the Bow and Kananaskis rivers in 1947. Department of Biology, University of Saskatchewan, Saskatoon, SK. Report prepared for Calgary Fish & Game Association, Calgary, AB. 77 p.

56. Armstrong, C., and H. V. Nelles. 2013. Wilderness and waterpower: How Banff National Park became a hydroelectric storage reservoir. University of Calgary Press, Calgary, AB. xviii+267 p., http://uofcpress.com/books/9781552386347.

57. Miller, *supra* note 32; Thomas, R. C. 1955. A report on conditions in the Kananaskis watershed in early June 1955. MS report, Fish and Game Branch, Alberta Lands and Forests, Edmonton, AB. 12 p.; Thomas, R. C. 1957. Effect of the Pocaterra power development on Lower Kananaskis Lake (1957). MS report, Fish and Game Branch, Alberta Lands and Forests, Edmonton, AB. 12 p.

58. Nelson, J. S. 1965. Effects of fish introductions and hydroelectric development on fishes in the Kananaskis River system, Alberta. Journal of the Fisheries Research Board of Canada 22:721–753. doi:10.1139/f65-064

59. Fitch, L. 1978. A report on biological inventories of 11 streams in the Crowsnest drainage district of Alberta. Alberta Recreation, Parks and Wildlife, Fish and Wildlife Division report, Lethbridge, AB. 92 p.

and angler satisfaction,[60] but recommendations by those biologists for limiting impacts from industrial or recreational development were not followed by provincial authorities. To the contrary, the intensity of mining, oil and gas development, recreational off-road vehicle use, and logging, all accompanied by an increasingly dense road and trail network, has greatly increased since the 1970s, with a correspondingly greater risk to stream habitat critical to any remaining native stocks of WSCT.[61] The few attempts to stem and reverse the effects of habitat destruction have been relatively ineffectual.[62]

The cumulative impact of all these developments on the distribution and abundance of the Alberta population of WSCT has been dramatic. Many major populations have been completely lost and replaced by non-native trout. The Alberta population of WSCT is now thought to have approximately forty-three unhybridized subpopulations remaining, out of an estimated total of 274 native stocks historically.[63] The exact number of genetically-pure populations of WSCT is unknown, and even some stocks counted as unhybridized show evidence of some hybridization.[64] Maps of

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60. Radford, D. S., and P. J. Wiebe. 1975. Recreational use and the factors influencing the enjoyment of a fishing trip on some mountain streams, the Livingstone and Oldman rivers. Fish and Wildlife Division, Department of Recreation, Parks and Wildlife, Lethbridge, AB. iii+20 p.; Radford, D. S. 1977. An evaluation of Alberta's fishery management program for East Slope streams. Alberta Fish and Wildlife Division, Department of Recreation, Parks and Wildlife, Lethbridge, AB. 67 p.

61. Sawyer, M. D., D. W. Mayhood, P. C. Paquet, C. Wallis, R. Thomas, and W. Haskins. 1997. Southern east slopes cumulative effects assessment. Hayduke Associates Ltd., Calgary, AB. x+231 p. doi:10.13140/RG.2.1.5155.6564

62. e.g., Pattenden, R., M. Miles, L. Fitch, G. Hartman, and R. Kellerhals. 1998. Can instream structures effectively restore fisheries habitat? pp. 1–11. *in* M. K. Brewin, and D. M. A. Monita, editors. Forest-fish conference: land management practices affecting aquatic ecosystems. Proceedings of the Forest-Fish Conference, May 1–4, 1996, Calgary, AB. Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, AB. Information Report NOR-X-356. xiv+533 p.

63. COSEWIC 2016, *supra* note 9.

64. Mayhood, D. W. and Taylor, E. B. 2011, Contributions to a recovery plan for Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) in Alberta: distribution, population size and trends. Report prepared for Fish & Wildlife Division, Alberta Sustainable Resource Development, by Freshwater Research Limited. FWR Technical Report No. 2011/06-1, Calgary, AB. vi+47 p. doi:10.6084/m9.figshare.11967582

the most current published understanding of historical and present genetically-pure WSCT populations in Alberta are available.[65] Almost all of the presently-known stocks are in low abundance.[66]

C. The Conservation Problem

The key requirements of any species recovery program are to first, prevent imminent extinction; second, to retain or restore the species' ability to adapt and survive in the longer term; and third, to enable the species to evolve. These three requirements are the baseline against which to measure the adequacy of any species conservation program.

To oversimplify slightly, when a species is designated as at risk, it is because its populations exist in low numbers. Extinction occurs when abundance declines to zero. There are special concerns for these small populations. For example, according to a widely used rule of thumb,[67] when the effective[68] population declines to approximately 500 adults, loss of genetic diversity through genetic drift (random loss of alleles due to chance) becomes a problem; when it declines to about fifty adults, inbreeding adds to that problem. Some would enlarge the rule to 100:1000,[69] therefore requiring much larger actual (census) populations and leading to some lively debate.[70] The essential point is that small populations have

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65. COSEWIC 2016, *supra* note 9: Figures 4, 5, and 7.

66. COSEWIC 2016, *supra* note 9: Table 4

67. 50:500 rule in Franklin, I. R. 1980. Evolutionary change in small populations. pp. 135–149. *in* M. E. Soulé, and B. A. Wilcox, editors. Conservation biology: an evolutionary-ecological perspective. Sinauer Associates, Inc., Sunderland, MA. xv+395 p.

68. Jamieson, I. G., and F. W. Allendorf. 2012. How does the 50/500 rule apply to MVPs? Trends in Ecology and Evolution 27:578–584. doi:10.1016/j.tree.2012.07.001. (The effective population is the size of an ideal population that would result in the same level of inbreeding or genetic drift as that of the population under study. In real populations, not all adults contribute offspring equally due to differences in physiology, behaviour, size, or many other factors. That has an effect on the genetics of the population; some breeders are more effective than others. Effective population size is always less than the actual (census) population size).

69. R. Frankham, C. J. A. Bradshaw, and B. W. Brook. 2014a. Genetics in conservation management: Revised recommendations for the 50/500 rules, Red List criteria and population viability analyses. Biological Conservation 170:56–63. doi:10.1016/j.biocon.2013.12.036.

70. R. Frankham, B. W. Brook, C. J. A. Bradshaw, L. W. Traill, and D. Spielman. 2013. 50/500 rule and minimum viable populations: response to

higher genetic risks that are especially severe at very low numbers. Additional risks to small populations are that they are subject to further decline from random demographic issues (e.g., difficulty in finding mates) or environmental catastrophes, especially where they are restricted to small, isolated habitats. The overall effect on extinction risk, including all factors, turns out to require population numbers at least in the low thousands to ensure high probability of persistence over the long term.[71]

The evidence is clear that overexploitation, habitat loss, and hybridization have dramatically reduced the distribution and abundance of the Alberta population of WSCT over its native range. WSCT in Alberta now mainly exist only as tiny, isolated, highly fragmented subpopulations, in the high elevation headwaters of the Bow River and Oldman River drainages. Many remaining stocks are continuing to decline in abundance, while facing novel challenges such as a warming climate. Many genetically unique, locally adapted stocks of a variety of life history types almost certainly have been lost, marking a loss of adaptive and evolutionary potential. The habitats they historically occupied have been markedly transformed, and in a number of cases no longer exist. These losses mean that it is essential to retain every remaining stock; however, because they are so small, the few remnant stocks are deteriorating genetically with every spawning season. These remaining stocks are also at high risk of succumbing to random habitat catastrophes or demographic issues.

Accordingly, the goal of WSCT recovery in Alberta must be to retain and rebuild the remaining stock structure and genetic diversity, while rebuilding the abundance and distribution of the Alberta population within the native range to a point where extinction of the subspecies and its representative life history forms is sufficiently unlikely. Preventing imminent extinction of Alberta's WSCT is simple conceptually. Both the

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Jamieson and Allendorf. Trends in Ecology and Evolution 28:187–188. doi:10.1016/j.tree.2013.01.002; Frankham, R., C. J. A. Bradshaw, and B. W. Brook. 2014b. 50/500 rules need upward revision to 100/1000 – Response to Franklin *et al*. Biological Conservation 176:286. doi:10.1016/j.biocon.2014.05.006; Jamieson and Allendorf (2012), *supra* note 68; Jamieson, I. G., and F. W. Allendorf. 2013. A school of red herring: reply to Frankham *et al*. Trends in Ecology and Evolution 28:188–189. doi:10.1016/j.tree.2013.01.012.

71. Reed, D. H., J. J. O'Grady, B. W., Brook, J. D. Ballou, and R. Frankham. 2003. Estimates of minimum viable population sizes for vertebrates and factors influencing those estimates. Biological Conservation 113:23–34; Traill, L. W., B. W., Brook, R. R., Frankham, and C. J. A. Bradshaw. 2010. Pragmatic population viability targets in a rapidly changing world. Biological Conservation 143:28/34. doi:10.1016/j.biocon.2009.09.00.

subspecies as a whole and its individual stocks are in low abundance. What is required is to increase abundance, specifically the numbers of reproductive adults.

To increase numbers in the wild, exploitation losses must be prevented in those stocks where it is a factor, but this alone is unlikely to be sufficient for population recovery. The size of exploited stocks may still be insufficient after exploitation is stopped. Many of the smallest, remote stocks are not subject to fishing because the individuals are too small; the likelihood of capture is too low; they exist in very small, unfishable streams; or they are otherwise unattractive to anglers. Abundances of those stocks must be increased in some other way.

Most importantly, stock abundances can be increased by protecting and restoring existing habitat presently occupied by genetically-pure fish, thereby improving habitat carrying capacity. Additional habitat secure from invasion by non-native species and from human development offers the greatest opportunity to increase stock abundances. If this is done in a fashion that reconnects now isolated but formerly connected native stocks, then gene flow will be re-established, ameliorating genetic diversity losses that will have arisen during the period of isolation. This, plus limited introduction of appropriately sourced new genetic stock into deteriorated stocks if required (often termed genetic rescue), would help to re-establish the abilities of recovery stocks to adapt and evolve. Details of how the recovery work could be done within the Alberta range have been presented at length elsewhere.[72]

To summarize, the basic requirements to recover the Alberta population of WSCT are as follows: (1) identify remaining genetically-pure stocks and their locations; (2) identify critical habitat necessary to support the remnant stocks; (3) identify and eliminate threats to WSCT and its habitat; (4) establish an estimate of the number of breeding adults required to ensure survival of the overall Alberta population with some acceptable level of probability; (5) establish an estimate of the amount of secure habitat needed to support the required number of breeding adults in each remaining stock needed for recovery; (6) develop an action plan that sets out a schedule of work to accomplish the above; and (7) implement the action plan and monitor results.

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72. Mayhood, D. W. 2014. Conceptual framework and recovery guidelines for restoring Westslope Cutthroat Trout populations in Alberta. FWR Freshwater Research Limited Technical Report 2014/03-1, Prepared on behalf of Timberwolf Wilderness Society for Alberta Sustainable Resource Development, Cochrane, AB, and Species at Risk Division, Fisheries & Oceans Canada, Winnipeg, MB. xii+90 p. doi:10.13140/2.1.1931.6809.

The Alberta population of WSCT was identified by Canadian officials as a threatened population in 2005 and is now subject to laws which require the development and implementation of a recovery framework. We now turn to an assessment of the extent to which these requirements have been or will be met.

III. THE RECOVERY FRAMEWORK FOR WESTSLOPE CUTTHROAT TROUT IN ALBERTA

A. Introduction

Fifteen years have elapsed since the Alberta population of WSCT was scientifically identified as a threatened species in 2005; however, since that time very few actual steps have been taken to address threats to remaining populations and recovery work is still in its early planning stages. The responsible federal officials have developed a recovery plan without key measures such as quantitative population or habitat restoration objectives and have also missed statutory deadlines related to protecting existing critical habitat. This saga is an illustration of what Daniel Farber labeled as 'slippage' in environmental law; a discrepancy between the law on the books and the law on the ground which arises as a result of government officials who fail to meet stipulated deadlines, who refuse to enforce the law, or who implement standards that diverge substantively from their written form.[73]

A primary reason for the 'slippage' in this case is the overlapping jurisdiction over freshwater fishes between the federal government and the province of Alberta. Almost all of the known populations of WSCT in Alberta are located on lands owned by the province. While the power to make laws in Canada governing threatened species and their habitat is primarily with the provincial governments outside of marine areas, national parks, and the northern territories, one notable exception is the federal government's power to make laws regulating freshwater fish habitat. However, these federal legislative powers are limited by a general principle of constitutional law in Canada that holds the federal government cannot in

73. Farber, *supra* note 1 at 301–311.

substance legislate over provincial matters under the guise of a regulatory scheme.

While legal responsibility for the development of a recovery framework for the Alberta population of WSCT lies with the federal Minister of the Department of Fisheries, Oceans and the Canadian Coast Guard (DFO Minister), the recovery framework is implemented on watercourses and riparian lands that are owned by Alberta and within the jurisdiction of Alberta Environment and Parks (Alberta Environment) and Alberta Forestry and Agriculture (Alberta Forestry). The slippage results, in part, from the fact that these provincial departments insist on adhering to the 'multiple use' policy that eschews rule-based habitat protection measures on the landscape. Records obtained by the authors under freedom of information legislation reveal that Alberta officials have pushed back against federal proposals regarding critical habitat designations for the Alberta population of WSCT.[74] Alberta Environment and Alberta Forestry continue to insist that a discretionary approach to habitat protection is effective; an approach which relies on terms and conditions attached to resource development project authorizations and voluntary measures by recreational users to address impacts to a threatened species and its habitat. The recovery framework developed by the DFO Minister for the Alberta population of WSCT reflects this influence, and it is apparent that federal officials deferred to provincial officials on the key recovery measure: critical habitat protection for WSCT.

B. An Overview of Threatened Species Legislation in Canada and Alberta

Threatened species protection legislation generally has two objectives: (1) protect a threatened species from further population decline; and (2) facilitate recovery of a threatened species to population numbers and a distribution that enables the species to sustain itself, adapt, and evolve. In order to become the beneficiary of these objectives, a threatened species must be designated or 'listed' under the legal framework. This structure is common to threatened species legislation across different jurisdictions.

Threatened species protection legislation in Canada is much younger than the decades-old Endangered Species Act[75] in the United

74. The authors made several requests for records under the Alberta *Freedom of Information and Protection of Privacy Act*, RSA 2000 c F-25 and the federal *Access to Information Act*, RSC 1985 c A-1 concerning the development of the recovery framework. All records obtained as a result of these requests and cited in this paper remain on file with the authors.

75. 16 U.S.C. §1531 et seq. (1973).

States. As a federalist state with legislative authority over threatened species shared amongst the federal, provincial and territorial governments, species protection is a collaborative policy initiative in Canada. Canadian jurisdictions entered into the *Federal-Provincial Accord for the Protection of Species at Risk* in 1996, whereby each jurisdiction committed to enact legislation to protect threatened species and their habitat.[76] The Canadian Parliament enacted the federal *Species at Risk Act*[77] (SARA) in 2002, and the provinces and territories either enacted their own dedicated threatened species protection legislation or added provisions to their respective wildlife management legislation.[78] Thus, as is the case with the Alberta population of WSCT, a threatened species in Canada may be listed under more than one legislative regime.

Alberta met its commitment under the *Federal-Provincial Accord for the Protection of Species at Risk* by amending its *Wildlife Act*.[79] The Alberta *Wildlife Act* enables the establishment of an advisory body to make recommendations on the designation of threatened species and provides for the development of a recovery plan; however the *Wildlife Act* neither obligates the development of a recovery plan nor does it require the designation or protection of critical habitat for threatened species.[80] Recovery plans developed under the Alberta *Wildlife Act* are typically informative in relation to species biology and threats to its habitat, but these plans have no legal bite and thus do not necessarily result in any protection for the species and its critical habitat. The absence of legal rules governing threatened species under the *Wildlife Act* means little transparency and accountability in land use decisions made by provincial officials that affect threatened species; a perfect complement to Alberta's 'multiple use' policy governing the eastern slopes of the Rocky Mountains.

The absence of an effective provincial legislative framework governing recovery and protection for the Alberta population of WSCT means that any such recovery framework must emanate from the federal SARA.

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76. *See* online: https://www.canada.ca/en/environment-climate-change/services/species-risk-act-accord-funding/protection-federal-provincial-territorial-accord.html.

77. SC 2002 c 29.

78. For a discussion of this generally and in relation to recent efforts to enact dedicated threatened species legislation in the Province of British Columbia *see* Westwood A.R., et al. (2019) Protecting biodiversity in British Columbia: Recommendations for developing species at risk legislation. FACETS 4: 136–160. doi:10.1139/facets-2018-0042.

79. RSA 2000 c W-9. *See* Shaun Fluker & Jocelyn Stacey, *The Basics of Species at Risk Legislation in Alberta*, 50 ALTA L REV 95 (2012).

80. *Id.* at 98, 105–07.

C. Alberta population of WSCT Listed as a Threatened Species

The science on threatened species in Canada is administered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC is responsible for assessing the status of threatened wildlife populations in Canada and publishes a status report on assessed species that sets out biological information as well as matters such as population, distribution, habitat, and threats to the species. COSEWIC describes itself as follows:

> COSEWIC was created in 1977 to provide a single, scientifically-sound classification of wildlife species at risk of extinction. Each year it meets to assign risk categories for all native mammals, birds, reptiles, amphibians, fish, arthropods, mollusks, vascular plants, mosses and lichens included in its current mandate. As an independent, arms-length advisory panel to the Minister of Environment and Climate Change Canada, members are wildlife biology experts drawn from academia, government, non-governmental organizations and the private sector.[81]

A COSEWIC assessment on a threatened species is provided to the responsible federal minister (which is the DFO Minister for freshwater fishes such as WSCT) who then makes a recommendation to the federal executive cabinet (formally referred to in Canada as the Governor in Council) on whether to accept or reject the COSEWIC assessment. The ultimate decision on whether to list a species under SARA is a political determination made by the Governor in Council. This is a significant difference from a listing decision in the United States under the Endangered Species Act which is based solely on science and threats to a species.[82]

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81. Committee on the Status of Endangered Wildlife in Canada (COSEWIC), http://cosewic.ca/index.php/en-ca/about-us (last visited Dec. 29, 2019) (The COSEWIC website provides additional details on its structure, terms of reference, and assessment process).

82. ESA Basics, U.S. Fish and Wildlife Service (Jan. 2013), https://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf (Another notable difference between Canada and the United States with respect to listing decisions is that SARA does not include a provision analogous to section 4 of the Endangered Species Act that provides for the public to petition for a species listing and trigger obligations on responsible authorities).

There are four categories of an at-risk designation used by COSEWIC and incorporated into SARA: extirpated, endangered, threatened, and special concern. Each of these designations is defined in the legislation on terms that are common to threatened species legislation generally.[83] Schedule 1 of SARA sets out which species are listed under these categories. The decision to add a species to Schedule 1 is made by an order of the Governor in Council under SARA. As of the end of 2019, Schedule 1 of SARA listed 23 species as extirpated, 273 species as endangered, 144 species as threatened, and 182 species as special concern.[84]

COSEWIC assessed the Alberta population of WSCT as a threatened species in 2005.[85] The Governor in Council added the Alberta population of WSCT to Schedule 1 of SARA as a threatened species in March 2013.[86] This contrasts with the decision made by the United States Fish and Wildlife Service in 2003 to not list WSCT populations under the Endangered Species Act.[87]

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83. SARA § 2 (1). The definitions are as follows: 'extirpated species' means a wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild; 'endangered species' means a wildlife species that is facing imminent extirpation or extinction; 'threatened species' means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction; 'species of special concern' means a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

84. *Id*., Schedule 1.

85. The public registry maintained under SARA contains a summary description of the Alberta population of WSCT and some of the records produced in the assessment, listing and recovery process. The SARA registry is established pursuant to section 120 of SARA (see https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html) For the records published on the Alberta population of WSCT see online: SARA Registry https://species-registry.canada.ca/index-en.html#/species/861-605#species_summary.

86. SOR/2013-34 (March 8, 2013) Order Amending schedule 1 to the Species at Risk Act, P.C. 2013-266 March 7, 2013 - 2013-03-27 Canada Gazette Part II, Vol. 147, No. 7 at pages 637–640, see online: SARA Registry https://sararegistry.gc.ca/virtual_sara/files/orders/g2-147072.pdf. The British Columbia population of Westslope Cutthroat Trout was listed as a species of special concern under SARA in April 2017, see online: SARA Registry < https://species-registry.canada.ca/index-en.html#/species/1093-756>.

87. Endangered and Threatened Wildlife and Plants: Reconsidered Finding for an Amended Petition to List the Westslope Cutthroat Trout as Threatened Throughout Its Range, see online: US FWS < https://www.federalregister.gov/documents/2003/08/07/03-20087/endangered-and-threatened-wildlife-

The listing process under SARA foreshadowed the 'slippage' which has arisen in the development of a recovery framework for the Alberta population of WSCT. References in the listing decision made by the Governor in Council to assurances that recovery measures would be 'balanced' against development interests,[88] hint at the tradeoffs and negotiations which have subsequently impaired the implementation of the recovery framework, which is discussed in more detail below. Moreover, it is noteworthy that seven years elapsed between the scientific determination of COSEWIC in 2005 and the policy determination of the DFO Minister in June 2012 that the Alberta population of WSCT be listed as threatened under SARA.[89]

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and-plants-reconsidered-finding-for-an-amended-petition-to-list>. The FWS decision was based primarily on an assessment that included large numbers of hybrids (introgressed with native rainbows and other subspecies of Cutthroat Trout) located in the native range of WSCT in Idaho and Montana demonstrating morphologically similar character to genetically-pure WSCT. An earlier decision by the FWS to both include hybrids and identify hybridization as a threat to the species was successfully challenged on judicial review. The WSCT has been noted as a case study in the difficulties encountered in deciding whether to include hybrids in the assessment of a candidate species for listing under the Endangered Species Act (*See* Oliver Frey, "When Science and the Statute Don't Provide an Answer: Hybrid Species and the ESA" (2015) XXVI Duke Envtl Law and Policy Forum 181). Nonetheless, the distinction between natural or anthropomorphic hybridization and the decision by the FWS to include hybrids in its assessment of WSCT remains controversial. Allendorf *et al.* argue that the genetically-pure population of WSCT should be listed as a threatened species (Allendorf, F. W., R. F. Leary, N. P. Hitt, K. L. Knudsen, L. L. Lundquist, and P. Spruell. 2004. Intercrosses and the U.S. Endangered Species Act: should hybridized populations be included as Westslope Cutthroat Trout? Conservation Biology 18:1203–1212).

88. SOR/2013-34 (March 8, 2013), *supra* note 86.

89. Order Acknowledging Receipt of the Assessments Done Pursuant to Subsection 23(1) of the Act. P.C. 2012-838 June 19, 2012, see online: SARA Registry https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/orders/acknowledgement-receipt-assessments-july-2012.html. (This time gap elapsed despite section 25(3) of SARA which states the responsible Minister (the DFO Minister with respect to WSCT) must respond to the COSEWIC assessment within 90 days of receipt and section 27(3) which provides the Governor in Council with 9 months to respond to the COSEWIC assessment. In their study of listing decisions early in the administration of SARA, Finlay *et al.* cited extended consultations by the responsible Minister as one reason for delays in listing under SARA, and they also demonstrated that this was a significant predictor for a non-listing under SARA (*See* C. Scott Finlay et al, *Species Listing under Canada's Species at Risk Act,* 23 Conservation Biology 1609 (2009)).

D. The Development of a Recovery Framework for the Alberta Population of WSCT

Where a determination is made that recovery of a threatened species is feasible, SARA requires the responsible minister to prepare a recovery strategy and an action plan for the species that, among other things, identifies known threats to the species and its habitat, identifies critical habitat necessary for the survival and recovery of the species, sets out objectives for the recovery of the species, and outlines what actions will be undertaken to achieve the recovery objectives.[90] SARA requires the responsible minister to propose a recovery strategy no later than one year after an endangered species is listed and no later than two years after a threatened species is listed.[91]

These provisions in SARA demonstrate an intention that the development and implementation of a recovery framework follows closely after a decision is made to list a threatened species. Unfortunately, statutory deadlines with respect to the components of a recovery framework—the recovery strategy, critical habitat protection order, and action plan—are routinely missed by responsible ministers.[92] The recovery framework

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90. SARA §§ 41, 49.

91. SARA § 42. Once a proposed recovery strategy is published, SARA provides for a public comment period of 60 days, after which the responsible minister has 30 days to consider comments received and publish the recovery strategy in its final form (SARA § 43). The recovery strategy must also state when the action plan will be completed (SARA § 41(1)(g)), and similar to the recovery strategy, SARA provides for a 60-day comment period following which the responsible minister must finalize the action plan (SARA § 50). If the action plan is not completed in accordance with the timeframe set out by the recovery strategy, SARA requires the minister to publish a summary statement of what has been prepared in the plan by that time (SARA § 50(4)).

92. Timely completion of recovery strategies under SARA, more generally, has not been the norm and has been the subject of litigation in Canada. As of 2012 approximately 350 species were listed as threatened or endangered under SARA, and the evidentiary record in litigation commenced by several environmental groups in September 2012 noted that 167 recovery strategies were overdue. The plaintiffs were successful in obtaining a declaration issued by the Federal Court of Canada in 2014 that the failure by responsible Ministers to propose recovery strategies for these four species within the statutory time periods set out in SARA was unlawful. See *Western Canada Wilderness Committee v. Canada (Fisheries and Oceans)*, 2014 FC 148. Federal officials have since responded to this judicial ruling by producing recovery strategies at a faster rate, and recovery

developed for the Alberta population of WSCT illustrates a number of these 'slippage' points, as described below in the chronological discussion of: (1) the Alberta recovery plan completed in March 2013 and the initial SARA recovery strategy completed by the DFO Minister in March 2014; (2) the issuance of a critical habitat protection order by the DFO Minister under SARA in December 2015; and (3) the combined recovery strategy-action plan completed by the DFO Minister in December 2019.

1. 2013 Alberta Recovery Plan and 2014 SARA Recovery Strategy.

DFO officials completed the recovery potential assessment for the Alberta population of WSCT in 2009.[93] Crucially, this recovery assessment was based on a thorough expert scientific review.[94] It concluded that most of the remaining populations of native, genetically-pure WSCT in Alberta had a moderate potential to be recovered between 2009 and 2039.[95]

The initial SARA recovery strategy for the Alberta population of WSCT (hereinafter the 2014 recovery strategy) was completed in March 2014, one year after the species was listed as threatened under SARA.[96] This federal strategy incorporated part of the already-existing provincial Alberta recovery plan for the species,[97] which had been completed a year

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strategies for more than 100 at-risk species have been proposed since 2015 (Source: SARA Registry, *supra* note 85).

93. Department of Fisheries and Oceans ("DFO"). 2009. Recovery potential assessment of pure native Westslope Cutthroat Trout, Alberta population. Department of Fisheries and Oceans, Canadian Science Advisory Secretariat, Advisory Report 2009/050, revised March 2010, 19 p. http://www.dfo-mpo.gc.ca/csas/.

94. Cleator, H., J. E. Earle, L. Fitch, S. Humphries, M. Koops, K. E. Martin, D. Mayhood, S. Petry, C. J. Pacas, J. D. Stelfox, and D. Wig. 2009. Information relevant to a recovery potential assessment of pure native Westslope Cutthroat Trout, Alberta population. Fisheries and Oceans Canada, Canadian Science Advisory Secretariat Research Document 2009/036, revised February 2010, iv+26 p. http://www.dfo-mpo.gc.ca/csas/.

95. DFO 2009: Table 1, *supra* note 93.

96. Fisheries and Oceans Canada. Recovery Strategy for the Alberta populations of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) in Canada [Final]. Species at Risk Act Recovery Strategy Series. Fisheries and Oceans Canada, Ottawa. iv + 28 pp + Appendices (March 2014), see online: SARA Registry https://sararegistry.gc.ca/virtual_sara/files/plans/rs_truite_fardee_wstslp_cutthroat_trout_0314_e.pdf.

97. The 2014 federal strategy omitted sections 8 (action plan) and 9 (implementation schedule) of the Alberta recovery plan.

earlier by Alberta Environment in March 2013.[98] In fact, the pre-existing Alberta recovery plan constituted the majority of this initial SARA recovery strategy, and the key addition made by federal officials was the identification and designation of critical habitat for the Alberta population of WSCT.[99] The identification of known critical habitat must be included in a recovery strategy produced under SARA.[100]

Two types of critical habitat are recognized by and protected in SARA: residence and critical habitat. Residence in SARA is defined as a dwelling-place, such as a den, nest, or other similar area or place that is occupied or habitually occupied by one or more individuals during all or part of their life cycle, including breeding, rearing, staging, wintering, feeding or hibernating.[101] The legislation prohibits any damage or destruction to the residence of a listed threatened or endangered species.

In the 2014 recovery strategy, residence of the Alberta population of WSCT is narrowly described as only the redd: A depression in the stream gravel excavated by the female where her eggs are then laid and covered with gravel.[102] This restricted articulation of a residence does not include any of the other life history functions.[103] In biological actuality, the residence of WSCT consists of the lake or entire length of stream used by the fish for all of the life history functions set out in the definition of a 'residence' under SARA.

The fine distinction employed by the DFO Minister in the 2014 recovery strategy to narrow the extent of a WSCT residence becomes a significant issue for protection of the species when we also consider the identification of WSCT critical habitat in the recovery framework. SARA defines critical habitat as the habitat necessary for the survival or recovery

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98. The Alberta Westslope Cutthroat Trout Recovery Team. 2013. Alberta Westslope Cutthroat Trout Recovery Plan: 2012-2017. Alberta Environment and Sustainable Resource Development, Alberta Species at Risk Recovery Plan No. 28. Edmonton, AB. 77 pp., see online: Alberta Environment < https://open.alberta.ca/dataset/c9ab0297-c99a-4478-b9e5-ff8d7b9d2c03/resource/ab4527e8-0643-47ec-842a-efd79a6221b5/download/6246341-2013-alberta-westslope-cutthroat-trout-recovery-plan.pdf>.

99. DFO 2014, *supra* note 96 at 4–17.

100. SARA § 41.

101. SARA § 2.

102. DFO 2014, *supra* note 96 at 3.

103. The only published enforcement action to date under SARA for harm to the Alberta population of WSCT is, in fact, a successful prosecution for damage to residence by an off-road vehicle competition. See *R v French*, 2018 ABPC 296.

of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.[104] Critical habitat for WSCT as such was identified in the 2014 recovery strategy in two ways. First, the 2014 recovery strategy set out a table of general features and functions of critical habitat for each life stage: riffles, pools, food availability, cold water temperature, adequate water depth and velocity, riparian vegetation, undercut banks, and sediment/silt free substrate.[105] Second, the 2014 recovery strategy identified streams by name with the geographic coordinates identifying the downstream and upstream boundaries of critical habitat, which were also mapped.[106] These were the boundaries within which genetically-pure native WSCT were known to reside based on field collections used for analysis of genetic purity; thus, critical habitat was identified by what is known as the 'area of occupancy approach'.

The critical habitat identified in the 2014 recovery strategy was far less than what actually constituted habitat critical for the recovery and survival of remaining populations. The description of critical habitat did not include the stream channels and tributaries upstream from the occupied stream reaches, which must be protected to protect the occupied reaches. Second, the description was unclear on whether it included terrestrial riparian habitat necessary to maintain the features and functions that the strategy itself acknowledged as critical habitat.

Even resident stocks of inland Cutthroat Trout must move within seasons and over the years, sometimes considerable distances, to meet their life requirements.[107] Actual critical habitat for WSCT therefore likely extends considerably beyond the reaches identified in the 2014 recovery strategy, in both an upstream and a downstream direction. Moreover, the

104. SARA § 2.

105. DFO 2014, *supra* note 96, Table 1 at 6.

106. *Id.* at 7–16.

107. Fausch, K. D., and M. K. Young. 1995. Evolutionarily significant units and movement of resident stream fishes: A cautionary tale. pp. 360–70. *in* J. L. Nielsen, and D. A. Powers, editors. Evolution and the aquatic ecosystem: defining unique units in population conservation. American Fisheries Society Symposium 17. American Fisheries Society, Bethesda, Maryland. xii+433 p.; Brown, R. S. 1999. Fall and early winter movements of Cutthroat Trout, *Oncorhynchus clarkii*, in relation to water temperature and ice conditions in Dutch Creek, Alberta. Environmental Biology of Fishes 55:359–368. doi:10.1023/A:1007519419492.

critical habitat identified did not include any additional critical habitat required for recovery, despite the explicit reference to 'recovery' in the legislated definition of 'critical habitat'.[108]

Critical habitat for recovery should be determined on basis of population sizes needed to ensure, with high probability, the long-term persistence for each remaining stock. And thus, the stocks required for overall recovery also need to be identified. It has long been recognized that the genetic diversity in WSCT is distributed largely among populations; that is, many alleles have a narrow geographic distribution, but occur at relatively high frequency in local populations.[109] Individual stocks tend to be genetically distinct from one another in having unique alleles at high frequencies within each stock. WSCT stocks of the South Saskatchewan drainage of Alberta in particular are genetically divergent among themselves; more so than those in the upper Columbia and upper Missouri drainages in the United States.[110] This genetic diversity is what allows species to adapt to changing conditions, and ultimately to evolve. Accordingly, all of the few remaining stocks need to be retained and secure habitat for their recovery must be protected, as these few populations represent all that is left of the genetic diversity in the Alberta population of WSCT.

The second deficiency related to critical habitat identification in the 2014 recovery strategy was uncertainty on whether it included terrestrial riparian habitat. While the description in the recovery strategy included references to riparian vegetation as an attribute of critical habitat,[111] the explicit identification of critical habitat only referenced stream reaches to bankfull level.[112] This lack of clarity on a crucial aspect of the 2014 recovery strategy was almost certainly because federal officials expected or received significant opposition from provincial officials with Alberta

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108. The issue of identifying unoccupied areas as critical habitat for a threatened species has also been noted elsewhere. For a short discussion of this issue under the Endangered Species Act, see J.B. Ruhl, "What is Habitat?" (2019) 34:1 Natural Resources & Environment 1.

109. Allendorf and Leary (1988), *supra* note 41.

110. Leary, R. F., F. W. Allendorf, S. R. Phelps, and K. L. Knudsen. 1985. Population genetic structure of Westslope Cutthroat trout: genetic variation within and among population[s]. Proceedings of the Montana Academy of Sciences 45:37–45. Online version with additional data available from http://docs.streamnetlibrary.org/StreamNet_References/MTsn85203.pdf. Accessed 5 January 2020.

111. DFO 2014, *supra* note 96 at 6.

112. *Id*. at 7–16. And in many cases these areas were identified solely on the basis of where pure native WSCT were captured and genetically analyzed, usually on just one day, in one season.

Environment and Alberta Forestry to the inclusion of terrestrial riparian lands within the critical habitat designation.[113] We elaborate on this further below.

These deficiencies in the identification of critical habitat in the 2014 recovery strategy meant that the upstream channel network, terrestrial parts of the watershed linked to the WSCT-occupied streams, unsampled mainstems and tributaries, seasonally occupied critical habitat in downstream and tributary reaches, and additional critical habitat required for recovery, would not be protected under SARA. The DFO Minister acknowledged that sufficient critical habitat had not been identified in 2014 to achieve population and distribution objectives, and explicitly stated in the 2014 recovery strategy that additional critical habitat would be identified in a revised recovery strategy and or action plan.[114]

2. Critical Habitat Protection Order.

The 2014 SARA recovery strategy adopted the discretionary habitat protection measures set out in the Alberta recovery plan; measures which complement the 'multiple use' policy administered by Alberta officials in governing land-use decision-making along the eastern slopes of the Rocky Mountains. Under this approach, provincial officials have discretion to impose terms and conditions on land-use activities which establish operating standards designed to manage and mitigate damage to habitat.[115] Project licenses and authorizations with such terms and conditions require operators to adhere to these standards, however the extent to which there is compliance with these terms is largely unknown. Of all these discretionary measures, terms and conditions applicable to forestry operations with respect to watercourse crossings; water quality monitoring; site reclamation; road construction and run-off control; primarily implicate habitat protection for the Alberta population of WSCT. These operating standards typically result in buffers and thresholds to protect water quality and riparian habitat, however their effectiveness as protection measures is uncertain at best.[116]

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113. *Infra* notes 136–39.

114. DFO 2014, *supra* note 96 at 5.

115. Alberta Westslope Cutthroat Trout Recovery Plan: 2012–2017, *supra* note 98 at 46 –48.

116. *See e.g.*, Valdal, E. J. 2006. Cumulative effects of landscape disturbance on Westslope Cutthroat trout in the upper Kootenay River watershed: implications for management and conservation. Master's thesis, Faculty of Environmental Design, University of Calgary, Calgary, AB. ix+100 p.: Figure 4-1;

Silvester Creek offers an instructive example of the widespread difficulties with habitat protection under the 'multiple use' policy administered by Alberta and the reliance by provincial officials on discretionary measures to protect habitat. This seven km stream is identified as critical habitat in the 2014 recovery strategy, holding a genetically-pure population of WSCT isolated above an impassable waterfall. The population represents one of only two remaining genetically-pure stocks in the Elbow River watershed west of Calgary. Recreational off-road vehicle use, forestry, oil and gas, and livestock grazing are all permitted under provincial authorizations and remain active within the watershed despite the critical habitat designation.

The linear disturbance density from authorized activities in close proximity to Silvester Creek averages 2.5 $km \bullet km^{-2}$ over the watershed, but is as high as 4.8 $km \bullet km^{-2}$ in some parts, creating sixty-one watercourse crossings, each constituting an erosion point and source of mostly fine-grain sediments.[117] The combined effects of increased surface erosion from trail and road runoff entering at these crossings, and increased peak flows from clearcut areas that are not hydrologically recovered, is resulting in significant damage to WSCT habitat. Impacts from the dense linear disturbance network are changing channel structure, substrate composition, and total suspended sediments concentrations at and below stream crossings. The Silvester Creek WSCT population has declined by approximately 75 percent to just eighty-one adults since 2004–2006.[118] At that population size, its probability of persisting in the long term is very low.

Concerns with these deficiencies related to critical habitat identification and protection in the 2014 SARA recovery strategy was a topic of discussion at a meeting held in November 2014 between environmental

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Ripley, T., G. Scrimgeour, and M. S. Boyce. 2005. Bull Trout (*Salvelinus confluentus*) occurrence and abundance influenced by cumulative industrial developments in a Canadian boreal forest watershed. Canadian Journal of Fisheries and Aquatic Sciences 62:2431–2442. doi:10.1139/F05-150:Figure 2.

117. Erdle and Mayhood 2014, *supra* note 45; see also Mayhood 2013, *supra* Note 45; D. W. Mayhood. 2015. Upper Silvester Creek Sediment Source Survey 5 August 2013, FWR Technical Note No. 2015/10-2 prepared for Timberwolf Wilderness Society, Calgary, AB. doi: 10.13140/RG.2.2.19407.64168

118. COSEWIC 2016, *supra* note 9; Mayhood, D. W. 2019. Comments on the 2019 proposed recovery strategy & action plan for the Alberta population of Westslope Cutthroat Trout. Freshwater Research Limited report prepared on behalf of Timberwolf Wilderness Society, Pincher Creek, Alberta, for Species at Risk Directorate, Department of Fisheries, Oceans and the Coast Guard, Ottawa, Ontario. FWR Technical Note No. 2019/07-1, iv+29 p. doi:10.13140/RG.2.2.17310.48967

groups, federal DFO officials, and provincial officials with Alberta Environment.[119] Specific matters raised by environmental groups at this meeting included the ineffectiveness of the discretionary measures applied on forestry operations, deficiencies in the identification of recovery habitat, and the absence of a critical habitat protection order issued under SARA for the Alberta population of WSCT. The SARA critical habitat protection order was a matter of concern for environmental groups because the order is needed to trigger non-discretionary habitat protection under SARA for a threatened freshwater fish located outside a national park.[120]

SARA prohibits a person from destroying any part of critical habitat identified in a recovery strategy or an action plan for a freshwater fish.[121] For critical habitat located in a national park, this protection applies ninety days after the federal minister responsible for the parks designates the critical habitat with a description published in the Canada Gazette.[122] For critical habitat located outside of a national park, this protection applies to critical habitat which is designated in a critical habitat protection order issued by the DFO Minister.[123] SARA obligates the DFO Minister to issue the order no later than 180 days after the recovery strategy or action plan is completed.

The description of the small amount of WSCT critical habitat located in Banff National Park was issued by the federal minister responsible for national parks in accordance with SARA in June 2014, within the

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119. One of the authors attended this meeting in person. Meeting notes and other records remain on file with the authors.

120. SARA § 58. This limited application is because of the constitutional principle in Canada that the federal government cannot in substance legislate over provincial property under the guise of a regulatory scheme. Accordingly, habitat protection under SARA generally only applies to threatened species which are either located on federal lands such as a national park or which fall under federal legislative authority set out in section 91 of the *Constitution Act, 1867*, 30 & 31 Vict, c 3.

121. SARA § 58. This requirement has been the subject of litigation, and Canadian courts have ruled this protection is absolute and non-discretionary (see *Georgia Strait Alliance v Canada (Minister of Fisheries and Oceans)*, 2012 FCA 40).

122. SARA § 58(2). SARA requires the federal Minister of the Environment to publish this description no later than 90 days after the recovery strategy or action plan is completed, so effectively the critical habitat in a national park is protected by section 58 no later than 180 days after the recovery strategy or action plan is completed. The Canada Gazette is the official legislative publication of the federal government (see online: Government of Canada < http://www.gazette.gc.ca/accueil-home-eng.html>).

123. SARA § 58(4).

ninety-day timeline stipulated in the legislation. However, the critical habitat protection order needed for the majority of WSCT habitat, which is located on Alberta lands along the eastern slopes of the Rocky Mountains, was not issued by the DFO Minister before the statutory deadline passed in September 2014. This is the reason why environmental groups raised the issue of a missing SARA critical habitat protection order in November 2014. By May 2015 the order had still not been issued. The DFO Minister stated that work on the critical habitat protection order was ongoing and that, in the interim, other legislation would protect critical habitat for the Alberta population of WSCT.[124]

Under the threat of litigation,[125] the DFO Minister issued the SARA critical habitat protection order for the Alberta population of WSCT in December 2015.[126] The accuracy of the Minister's earlier claim in May 2015 that the delay was the result of ongoing work seems improbable given that the critical habitat protection order amounted to just one paragraph of text that referenced the description of critical habitat set out in the 2014 recovery strategy:

> Subsection 58(1) of SARA applies to the critical habitat of the WSCT Alberta population—which is identified in the recovery strategy included in the SARA Public Registry—other than the portion of that critical habitat that is

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124. Letter on file with the authors. The Minister referenced sections 32 and 33 of SARA, neither of which protect critical habitat. The Minister also referenced section 35 of the *Fisheries Act*, RSA 1985 c F-14 which prohibits an activity that results in the harmful alteration, disruption or destruction of fish habitat, unless such activity is authorized by the Minister or otherwise in law. The problem with the Minister's reference to section 35 is that the Federal Court of Canada had already ruled that section 35 of the *Fisheries Act* was not an equivalent to section 58 of SARA because section 35 of the *Fisheries Act* does not provide non-discretionary legal protection (See *Canada (Fisheries and Oceans) v David Suzuki Foundation*, 2012 FCA 40). For some discussion of the discretionary protection offered by section 35 of the *Fisheries Act*, see Martin Olszynski, "From 'Badly Wrong' to Worse: An Empirical Analysis of Canada's New Approach to Fish Habitat Protection Laws" (2015) 28 Journal of Envtl Law & Practice 1.

125. The authors were involved as one of the applicants and legal counsel in this litigation: Alberta Wilderness Association and Timberwolf Wilderness Society v. Minister of Fisheries and Oceans, Court File No. T-1585-15, Notice of Application dated September 18, 2015 (Federal Court of Canada).

126. See, https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/critical-habitat-orders/westslope-cutthroat-trout-alberta.html.

> already protected under that subsection because it is in a place referred to in subsection 58(2) of that Act, more specifically, in Banff National Park as described in Part 2 of Schedule 1 to the Canada National Parks Act.[127]

This order engaged the prohibition in SARA against the destruction of any critical habitat for the Alberta population of WSCT identified by the 2014 recovery strategy on public lands in Alberta along the eastern slopes of the Rocky Mountains.

3. 2019 SARA Recovery Strategy-Action Plan.

While SARA does not legislate a timeframe for the development of an action plan which sets out how recovery objectives will be met, the legislation does require a recovery strategy to indicate when an action plan will be completed.[128] Consistent with other steps in the development and implementation of a recovery framework for SARA-listed species, the deadline for completion of an action plan is routinely missed.[129] In the case of the Alberta population of WSCT, the 2014 recovery strategy stated an action plan would be completed by the end of March 2015.[130] The proposed action plan was not published until May 2019, and as with the critical habitat protection order, the proposed action plan was published in

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127. *Id.*

128. SARA, § 41(1)(g).

129. Late completion of action plans by responsible ministers is a systemic issue under SARA. As of the end of 2019, there were 304 completed recovery strategies published on the SARA registry and only 79 proposed or final action plans (see SARA registry, *supra* note 86). These aggregate numbers indicate that for the majority of species with a recovery strategy there is no action plan. The large discrepancy between the number of completed recovery strategies and action plans is a strong indication of delay in finalizing an action plan for threatened species under SARA.

130. DFO 2014, *supra* note 96 at 26. In this discussion concerning the action plan for WSCT, we are referencing the action plan for implementing WSCT recovery measures on provincial lands outside of Banff National Park. In December 2017 Parks Canada issued an omnibus multispecies action plan for Banff National Park that sets out WSCT recovery objectives for all threatened species located in the park, including WSCT. The stated measures to achieve recovery of WSCT in the park include the removal of introduced hybrid species that compete with native WSCT and restoration of WSCT habitat in the park. See "Multi-species Action Plan for Banff National Park of Canada, online: SARA Registry: < https://sararegistry.gc.ca/default.asp?lang=En&n=A8819D2B-1>.

response to the threat of litigation.[131] The completed action plan was finalized by the DFO Minister in December 2019; almost five years later than promised in the 2014 initial recovery strategy.[132]

In August 2016, two environmental groups wrote to the DFO Minister describing ongoing threats to the Alberta population of WSCT and requesting that the Minister complete the action plan which, at that time, was already 16 months overdue.[133] In November 2016 the DFO Minister responded by explaining that the delay was caused by a decision to complete an action plan in conjunction with updating the 2014 recovery strategy; the DFO Minister also stated the combined recovery strategy-action plan would update critical habitat identification as well as set out specific measures to achieve recovery objectives.[134] In May 2017 the DFO Minister reiterated this explanation in a public notice, as required by SARA

131. The authors commenced litigation against the DFO Minister in February 2019 seeking an order from the Federal Court of Canada that the Minister propose an action plan for the Alberta population of WSCT. *See* Timberwolf Wilderness Society v. Minister of Fisheries, Oceans and the Canadian Coast Guard, Federal Court of Canada File No. T-270-19 (February 11, 2019).

132. Despite the absence of an action plan between 2015 and 2019, some actual steps were taken on recovery measures for the Alberta population of WSCT. However, these recovery actions consisted mostly of small-scale measures, uncoordinated by a formal action plan, unmonitored, and mostly ineffective. In response to the large-scale flood event along the eastern slopes during June 2013, Alberta funded a three-year, $10 million habitat restoration program (the FISHES program) intended to effectively restore flood affected fish habitat by identifying the key factors which are limiting aquatic productivity in flood affected watercourses in southern Alberta (See https://www.alberta.ca/how-fishes-works.aspx accessed 2020-01-12). The FISHES program favoured WSCT critical habitat identified in the 2014 recovery strategy that had been damaged by the 2013 flood. Each project was documented in a series of two-page promotional reports to the general public, accompanied by brief video clips showing some of the problems assessed (See https://www.alberta.ca/fishes-program-updates.aspx accessed 2020-01-12). Projects were selected and prioritized using a formal scientific assessment procedure by a team of fisheries biologists and other aquatic specialists (see https://open.alberta.ca/publications/9781460127315 accessed 2020-01-12). FISHES suffered from a number of failings as a WSCT habitat recovery program. Most importantly, these actions were not targeted at the known threats to critical habitat from high-intensity industrial and recreational land-use along the eastern slopes.

133. This letter is on file with the authors.

134. Letter written by DFO Minister dated November 21, 2016 is on file with the authors.

when an action plan is not completed by the deadline set out in the recovery strategy.[135] The official position for the delayed action plan was thus essentially the same explanation given by the DFO Minister for the missing critical habitat protection order in 2015: more information is needed and the work is ongoing. However, internal records suggest another reason for the delay was opposition expressed by Alberta officials to proposed critical habitat for WSCT.

Federal officials provided Alberta Environment and Alberta Forestry with a draft revised recovery strategy-action plan in early 2017. Alberta Forestry expressed concern with a 100 meter riparian buffer on both sides of watercourses identified as critical habitat for WSCT because of the high potential for this buffer to negatively impact forestry operations.[136] Alberta Forestry also questioned whether these riparian buffers would serve to protect the functions, features, and attributes of WSCT habitat in a manner that is not already provided by operating terms and conditions attached to forestry authorizations.[137] Alberta Forestry recommended that the revised recovery strategy-action plan adopt the much smaller buffers set out in these terms and conditions, essentially maintaining the deficient description in the 2014 recovery strategy.[138] In response, federal DFO officials agreed to receive a submission from Alberta Environment and Alberta Forestry on revising the description of riparian habitat for WSCT; and in early September 2017 Alberta officials provided DFO officials with this submission.[139] The Alberta proposal was reviewed internally by DFO in October 2017; thereafter, further back-and-forth on the proposal occurred between federal and provincial officials and it is apparent that by March 2018 there was a near-complete draft of the revised recovery strategy-action plan that identifies additional watercourses as critical habitat for WSCT.[140] Nonetheless, the DFO Minister waited another year before publishing a proposed action plan combined with a revised recovery strategy for the Alberta population of WSCT.[141]

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135. SARA, § 50(4).

136. Email correspondence dated March 13, 2017 and June 22, 2017, and an internal memorandum dated March 21, 2017, both on file with the authors.

137. *Id.*

138. *Id.*

139. Email correspondence dated September 1, 2017, on file with the authors.

140. Email correspondence dated March 22, 2018, on file with the authors.

141. Department of Fisheries, Oceans and the Coast Guard (DFO). 2019a. Recovery strategy and action plan for the Alberta populations of

The 2019 SARA recovery strategy-action plan includes the action plan and implementation schedule portion of the 2013 Alberta recovery plan that were not included in the 2014 SARA recovery strategy.[142] In fact, the implementation measures for WSCT recovery set out in the Alberta 2013 recovery plan, including a schedule, constitute the only actions proposed in the 2019 recovery strategy-action plan.[143] In other words, it is apparent that in the 2019 recovery strategy-action plan the DFO Minister did little more than adopt the remaining portions of the 2013 Alberta recovery plan; a document which was developed at a much earlier time based on deficient information in relation to the genetics of the Alberta population of WSCT, quantifiable population targets,[144] and identified critical habitat. The 2019 recovery strategy-action plan does not set out strategy or a plan for protecting and restoring critical habitat, other than identifying the same discretionary measures which were adopted from the 2013 Alberta recovery plan by the initial SARA recovery strategy.[145] These are surprising observations, particularly in light of the fact that almost seven years had elapsed since the initial SARA recovery strategy was completed and the DFO Minister had stated, on numerous occasions, that significant work was ongoing and that specific measures for recovery would be included in the updated strategy.

The identification of critical habitat was also substantially changed in the 2019 recovery strategy-action plan. The document still outlines critical habitat in two forms: (1) in a table of functions, features and attributes for each of four life history stages;[146] and (2) in a series of

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Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) in Canada (proposed). Department of Fisheries, Oceans, and the Coast Guard, Ottawa, ON. vii+147 p. https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/plans/Proposed%20WSCT%20RS%2DAP%20Part%201%20and%202%20April%2011%20clean1%2Epdf.

142. Department of Fisheries, Oceans and the Coast Guard (DFO). 2019b. Recovery strategy and action plan for the Alberta populations of Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*) in Canada (final). Department of Fisheries, Oceans, and the Coast Guard, Ottawa, ON. vii+149 p. https://sararegistry.gc.ca/virtual_sara/files/plans/RsAp-TruiteFardeeOuest-WestslopeCutthroatTrout-v00-2019-Eng.pdf.

143. DFO 2019, *Id.*

144. While in 2014 the data necessary for computing population targets was unavailable, this information is available now. See COSEWIC 2016, *supra* note 9 at Table 4.

145. DFO 2019, *supra* note 142.

146. *Id.*

maps with a tabulated set of geographic coordinates.[147] However, a literal reading of the description now requires a feature (and the function it supports) to actually be present in order for the geographic area to be identified as critical habitat:

> Note that not all attributes in Table 2 must be present in order for a feature to be identified as critical habitat. If the features as described in Table 2 are present and capable of supporting the associated functions, the feature is considered critical habitat for the species, even though some of the associated attributes might be outside of the range indicated in the table.[148]

This revision significantly obscures a geo-spatial identification of critical habitat for WSCT. Moreover, this is exacerbated by the fact that the 'area of occupancy' approach used in the 2014 recovery strategy is replaced in this new document with a 'bounding box' approach to identifying critical habitat.[149] Unlike the 'area of occupancy approach' which produced geo-spatial coordinates in watercourses where genetically-pure WSCT were known to exist and critical habitat constituted the entire stream length within those coordinates, the 'bounding box' approach sets out geo-spatial coordinates within which critical habitat exists only in areas where there is the presence of a feature that supports a function for any of the WSCT life stages. In other words, the 'bounding box approach' expands the reach of geospatial coordinates set out in the identification of critical habitat, however actual critical habitat is not explicitly identified and mapped within the 'bounding box'.[150]

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147. *Id.*; Appendix D.

148. *Id.* at 16.

149. *Id.*

150. The maps contained in the 2019 recovery strategy-action plan show a dense network of streams identified as areas within which critical habitat is found, but these maps do not specifically delineate where that critical habitat actually is within the coordinates of the bounding box (DFO 2019b: Appendix D). On the other hand, the maps also show points to locate areas within which critical habitat is found, and those points are also tabulated as locations of flowing waters or lakes identified as critical habitat for Westslope Cutthroat Trout. The document does not clearly state what is meant by these descriptions. Taken literally, it may mean that those specific points are the areas holding critical habitat (unlikely). Or it may mean the stream length between the two points in each marked drainage may hold critical habitat (more likely). If the latter, the line between those two

Critical habitat in the 2019 recovery strategy-action plan can only be identified by documenting the existence of each life history stage using a particular location within the bounding box at a particular time. This raises serious concerns about critical habitat identification because stream habitat is highly dynamic. Whether any given location for any life history stage is critical habitat under this approach is likewise highly variable. Within the native range of WSCT in Alberta, fluctuations in stream hydraulics that change the usage of instream habitat can occur in minutes or even seconds and vary as the hydrograph and ice-cover change seasonally. In short, critical habitat identification under the bounding box scheme is an ever-moving target. This raises similar problems with identifying riparian habitat. The 2019 recovery strategy-action plan states that critical habitat includes all riparian areas on both stream banks for the entire length of the stream segments and all banks of waterbodies identified as critical habitat. Additionally, the plan sets the width of the riparian buffer at only thirty meters from both sides of the channel bank.[151]

Curiously, the 2019 recovery strategy-action plan states: "It is important to note that the setting of population and distribution objectives and the identification of critical habitat are science-based exercises and socio-economic factors were not considered in their development."[152] The records we reviewed for this study raise significant questions over the accuracy of this statement and provide evidence to the contrary that socio-economic considerations strongly influenced the design of the recovery framework, including the designation of critical habitat, for the Alberta population of WSCT. The problems and deficiencies noted in the identification of critical habitat in the 2019 recovery strategy-action plan significantly undermine the extent of non-discretionary critical habitat protection provided by SARA since the 2015 critical habitat protection order referentially incorporates the description set out in the recovery strategy-action plan.[153]

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points bypasses most of the stream network identified as critical habitat on the map. Then again, referring to the maps, it is stated that "unnamed tributaries within the stream segments of designated critical habitat are included as critical habitat unless otherwise stated." (*Id*. at 15). Here it appears that all of the stream lengths identified in the map are to be taken as critical habitat. If this is so, it is difficult to ascertain the purpose of the two geographic coordinates in each drainage network?

151. *Id*. Recall that DFO officials had originally proposed a 100 metre riparian buffer, but this was opposed by Alberta Forestry.

152. DFO 2019, *supra* note 142 at iii.

153. *Supra* note 127.

IV. CONCLUSION

Simple physics tells us that watersheds drain via their watercourse networks and groundwater systems to their mainstem streams, and it is undisputed that watershed health is reflected in the health of the aquatic systems in numerous other ways.[154] In biological reality, the entire length of stream used by trout at any stage or time in their life history is critical habitat. Fish need places to spawn, incubate their eggs, rear, feed, seek refuge from unfavourable conditions, and overwinter. Because these places vary with flow, water temperature, and other stream characteristics, the location of these necessary habitats change, so there must be routes and conditions allowing free movement among them. The science suggests that entire watersheds along the eastern slopes of the Rocky Mountains, and all the stream channels contained therein, are critical habitat for WSCT. The mere fact that responsible officials delay and debate with each other over the size of relatively miniscule terrestrial riparian buffers that have little scientific basis demonstrates just how far removed the policy on threatened species can be from the science.

Our reason for telling this story about recovery efforts for the threatened Alberta population of WSCT is to demonstrate how ineffective legislation can be in the face of entrenched views about land-use decision-making on public lands. Statutory rules in Canada's most comprehensive threatened species legislation have been rendered almost completely ineffective by responsible officials who remain faithful to the false promise of environmental stewardship under the 'multiple use' policy. The ongoing decline of the Alberta population of WSCT clearly illustrates that unabated adherence to this policy governing public lands will lead to extinction of the species.

Missed statutory deadlines and extensive delays in the finalization of a recovery framework has significantly impaired implementation of action necessary to protect what remains of WSCT in Alberta and facilitate population recovery. Despite these setbacks, much of a recovery framework is in place. Genetically-pure stocks have been identified, and genetic work capable of much more detailed assessment of stocks is ongoing. This is an essential foundation for all future recovery action of the species. Threats to WSCT and its habitat are well known, and in a general sense have been adequately described in the recovery framework. The data on

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154. USEPA (US Environmental Protection Agency). 2015. Connectivity of streams and wetlands to downstream waters: A review and synthesis of the scientific evidence. EPA/600/R-14/475F, United States Environmental Protection Agency, Washington, DC. xx+388 p. https://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=296414.

population numbers needed for recovery of many stocks, and the methods for estimating the amount of critical habitat required to support stocks of adequate size to persist are known. But what is left unfinished in the recovery framework for the Alberta population of WSCT is the crucial step: the identification and designation of critical habitat along with implementation of effective measures to protect what remains of that habitat and restore additional habitat for recovery purposes.

Critical habitat designation and protection for the Alberta population of WSCT has been undermined by government officials who appear unwilling to implement real protection and timely recovery actions for the species. As a result, statutory rules in Canada's most comprehensive threatened species legislation have been rendered almost completely ineffective. If we are to achieve the purpose of this legislation and halt the demise and facilitate the recovery of the Alberta population of WSCT, as well as other species in decline along the eastern slopes of the Rocky Mountains, we can no longer manage public lands exclusively for the benefit of industrial, agricultural, and recreational users. While litigation, or the threat of it, may be successful at achieving gains for threatened species on a case-by-case basis, it is unlikely to result in the broader governance changes required. We must question the truth of a claim that environmental stewardship is achievable in the face of economic development when the persistence of a threatened species hangs in the balance. In these cases, the time for tradeoffs and mitigation is over if we are to take meaningful steps to address the extinction crisis sweeping the planet.

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