



5 • The Teshekpuk Lake area supports significant biodiversity value compared to the rest of the Alaska-Yukon Arctic ecoregion. Of 82 Teshekpuk Lake area planning units, 99% score in the 80<sup>th</sup> percentile in a relative biodiversity measure for the whole ecoregion. Higher scores indicate areas where there is either a greater diversity of species or a greater concentration of an individual species.

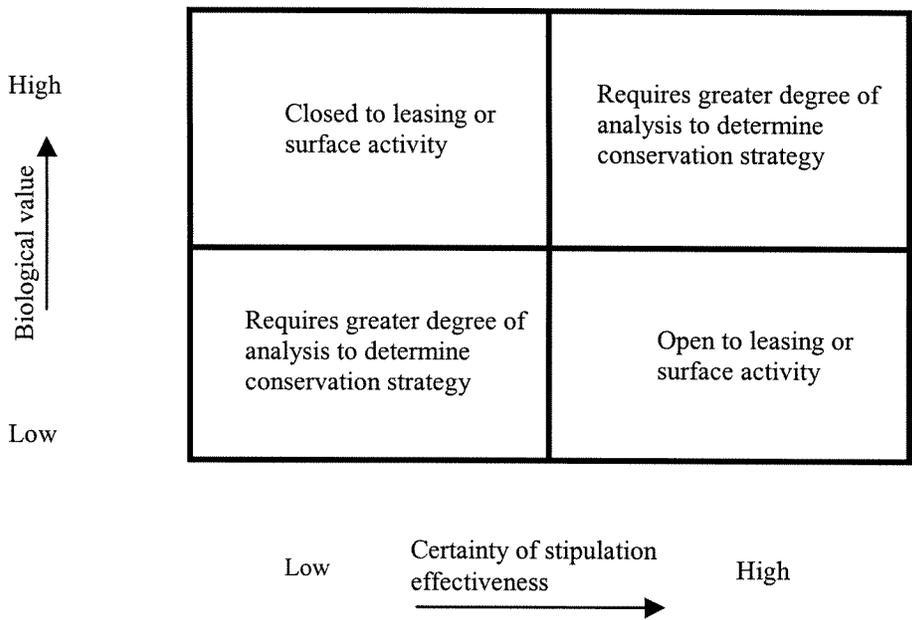
6 • Teshekpuk Lake area supports significant biodiversity value within the Beaufort Coastal Plain subregion. When compared only to the rest of the plain, 72% of the planning units score above the 70<sup>th</sup> percentile in a relative biodiversity measure.

7 • The northern, eastern, and southeastern portions of the Teshekpuk Lake area are particularly high on the relative biodiversity index

8 • Three species targets (separated into five life-stage targets) are very heavily represented; over 50% of their total distribution in the ecoregion occurs in the Teshekpuk Lake area. These include geese molting concentrations (100%), Teshekpuk Lake caribou mosquito relief area (100%), Teshekpuk Lake caribou calving area (53%), Teshekpuk Lake caribou oestrid fly relief area (48%) and black brant nesting colonies (46%).

9 Clearly, Teshekpuk Lake has great significance to biodiversity, and requires careful management to ensure the long-term vitality of its fish and wildlife. One of the issues in the EIS is whether or not certain areas around Teshekpuk Lake should be closed to oil and gas leasing and/or surface activity. Closures as a conservation tool offer the least risk to biodiversity and provide protection to the largest number of species within a given area. There are, however, multiple tools available, including stipulations, required operating procedures, self-regulation, and biological monitoring that provide varying degrees of conservation for important species and habitats. Due to the significance of this area to several species, it is incumbent on the BLM to prove that mechanisms for mitigating development impacts, such as stipulations, can ensure adequate protection of the important species and habitats.

10 The type of conservation tool chosen should depend strongly on the level of biodiversity value and the certainty that the conservation tool will conserve that value. As illustration, the following diagram depicts how one might assess the need for closure versus stipulations. If biodiversity value is very high, but certainty of the effectiveness of stipulations is low, then this is an area where closures are necessary. If on the other hand, biodiversity is low and the certainty of effectiveness is high, then this is an area where stipulations or operating procedures alone may be enough to conserve biodiversity. In the remaining two categories—high biodiversity/high certainty and low biodiversity/low certainty—careful analysis of conservation strategies and risk is warranted and a combination of tools may be necessary.



11 For the sake of this EIS comment, the Conservancy extended its analysis of the Teshekpuk Lake area to consider where the risks to biodiversity had the potential to increase if the current surface protection area (Alternative A) was modified to Alternative B or C.

12 The current surface protection area contains a large percentage of the habitats important for geese (including black brant), ducks, Sabine’s gull, and the Teshekpuk Lake caribou herd (see table below). In addition, 100% of the goose molting concentration areas and mosquito relief areas for the caribou herd within the ecoregion fall within the current surface protection area.

013 Wild Life The current closures to leasing or surface activity, however, do not apply to large amounts of the breeding density areas for several waterfowl species, shorebirds, and Sabine’s gull, or the places where the Teshekpuk Lake caribou concentrate for calving, summering, or wintering (please see table below). For example, only 53% of the calving area is represented in areas currently closed to leasing and/or surface activity.

014 Alternatives Alternative B would reduce by nearly 75% the existing Teshekpuk Lake area closures. The table below shows the percentages of distribution among targets that are heavily represented in the Teshekpuk Lake area when the different protection boundaries under alternatives A and B are considered. For example, almost one half (46%) of the brant nesting colonies across the ecoregion are found in the current surface protection area. Alternative B applies closure to only 10% of the ecoregional distribution. Alternative C eliminates all closures in the Teshekpuk Lake area, and so, if it were without effective stipulations, has the potential to impact over half of the brant nesting colonies in the ecoregion.

15 The shaded areas in the table below highlight the five life-stage targets which represent biodiversity values most at risk from a change in the current surface protection area: Teshekpuk Lake caribou calving, mosquito relief, and fly relief areas, geese molting concentration areas, and black brant nesting colonies.

Target Species	Life Stage Target	Percentage of Ecoregional Distribution	
		Alt A Closed Areas	Alt B Closed Areas
Geese (black brant, Canada, white-fronted, and snow geese)	<i>molting concentrations</i>	100%	63%
	<i>nesting concentrations</i>	20%	6%
Teshekpuk Lake caribou	<i>mosquito relief area</i>	100%	67%
	<i>calving area</i>	53%	4%
	<i>oestrid fly relief area</i>	48%	22%
	<i>summer area</i>	17%	5%
black brant	<i>wintering area</i>	3%	0%
	<i>nesting colonies</i>	46%	10%
sabine's gull	<i>breeding density</i>	7%	4%
	<i>colonies</i>	45%	45%
ducks	<i>breeding density</i>	6%	3%
	<i>molting concentrations</i>	43%	31%
spectacled eider	<i>nesting concentrations</i>	12%	4%
	<i>breeding density</i>	8%	4%
yellow billed loon	<i>breeding density</i>	4%	1%
shorebirds	<i>breeding density</i>	5%	2%
white fronted goose	<i>breeding density</i>	6%	3%
long-tailed duck	<i>breeding density</i>	4%	2%
<b>Total = 10</b>	<b>Total = 18</b>		

016  
Vegetation

Similar to some species, a number of terrestrial ecosystems defined for the assessment occur only on the Beaufort Coastal Plain.<sup>1</sup> Four of these ecosystems (coastal wet sedge tundra, lowland lake, coastal barrens, and coastal grass and dwarf shrub tundra) are significantly represented inside the current surface protection area but outside the area proposed closed to leasing in Alternative B (see table on following page). These four ecosystems are also greatly underrepresented in the conservation network in the ecoregion; only 4% or less of each system's ecoregional distribution in the coastal plain is located on lands managed for conservation.<sup>2</sup>

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In summary, reduction of areas closed to surface activity may pose greatest risk for molting concentration areas for black brant and other geese, nesting colonies of black brant, and seasonal use areas of the caribou herd. Alternative C would allow activity in all of the places used by geese for molting and by the caribou herd to seek relief from mosquitoes and nearly half (46%) the colonies where black brant are known to nest. Clearly, absent other sound mitigation and management measures, Alternative A poses the least risk to the biodiversity of the Alaska-Yukon Arctic ecoregion and the Beaufort Coastal Plain, and Alternative C poses the greatest.

<sup>1</sup> See Update #2: Predictive Terrestrial Ecosystem Model .

<sup>2</sup> See Update #3: Gap Analysis of Terrestrial Ecosystems for more information about the classification of lands managed for conservation and the conservation status of terrestrial ecosystems in the Alaska-Yukon Arctic ecoregion.

Target Systems	Percentage of Ecoregional Distribution	
	Alt A Closed Areas	Alt B Closed Areas
coastal wet sedge tundra	18%	7%
lowland lake	12%	2%
coastal barrens	22%	13%
coastal grass and dwarf shrub tundra	19%	8%
lowland wet sedge tundra	4%	1%
riverine wet sedge tundra	1%	0%
<b>Total = 6 terrestrial systems</b>		

018  
Stips &  
ROPs

The Conservancy has not analyzed the BLM’s proposed performance-based stipulations and required operating procedures for their adequacy in ensuring the compatibility of development with adequate protection of these valuable natural resources. Many of the stipulations are designed to mitigate impacts on habitats for certain species during different seasons. It is conceivable, however, that some areas may require closure to development where stipulations fall short of necessary resource protection. Furthermore, in all cases, the BLM can grant exceptions to stipulations if the lessee/permittee can demonstrate to the Authorized Officer’s satisfaction that the existing stipulation is technically not feasible, is economically prohibitive, or that an alternative is available that fully satisfies the objectives of the existing stipulation. The resulting lack of certainty of protection increases the risk that we could lose very significant portions of our biodiversity resources.

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The Conservancy believes that we should strive to balance our economic and environmental needs; in doing so, a well-balanced management plan often includes the full range of conservation tools from closures to stipulations, depending on the specific place and species. The Conservancy also recognizes that the warming climate that is being experienced in the Alaskan Arctic will have pronounced effects on the dynamics of ecosystem relationships in the Teshekpuk Lake area and must be a necessary focus of continuing assessment of the adequacy of any conservation strategies employed. Similarly, conservation of the unique biodiversity of the Teshekpuk Lake area will also require assessment of the impacts of development activities in the broader region of the north east section of NPR-A. The Conservancy welcomes the opportunity to work with stakeholders in the region to identify the conservation strategies that are best suited for Teshekpuk Lake’s unique and special areas.

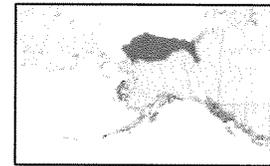
Sincerely,



David Banks  
State Director

attachment

## Alaska-Yukon Arctic Ecoregional Assessment Update #11: Application of Ecoregional Data: Teshekpuk Lake Case Study

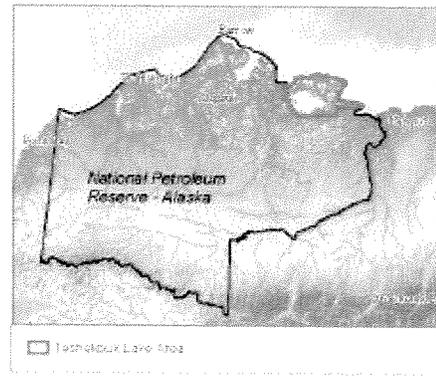


### Introduction

In 2001, The Nature Conservancy began a comprehensive ecological assessment of the Alaska-Yukon Arctic ecoregion with the goal of identifying the lands and waters important for sustaining the ecoregion's biodiversity. In the first part of the assessment, we collected and catalogued information about conservation targets—the species, natural communities and ecological systems representative of the biodiversity of the ecoregion. Extensive biological data on these targets were compiled in a spatial database for use in mapping and analysis. We also developed several analytical tools, including predictive ecosystem models, a relative biodiversity index and a decision support tool. A full project description and the products of the assessment to date are available online at [nature.org/alaska](http://nature.org/alaska).

The Conservancy is now in the second phase of the assessment—working with partners and stakeholders to use the ecoregional data in the development of a conservation blueprint for the ecoregion. The blueprint will be a shared vision of key habitats in the region with strategies to conserve these habitats and the species that rely on them. As a first case study in the application of the assessment tools and data, the Conservancy has examined the relative biodiversity significance of Teshekpuk Lake. The Teshekpuk Lake area is in the northeast section of NPR-A<sup>1</sup> and is currently the focus of a significant land management decision. Teshekpuk Lake has long been recognized as important habitat for caribou, shorebirds, black brant, spectacled eider, and other waterfowl. In particular, Teshekpuk Lake provides critical molting and nesting habitat for a number of these waterfowl and provides important habitats for the Teshekpuk Lake caribou herd.

**Figure 1.** Location of Teshekpuk Lake



This update applies ecoregional data to describe the biodiversity of Teshekpuk Lake relative to the ecoregion and the Beaufort Coastal Plain and discusses the species and ecological systems that are disproportionately represented at Teshekpuk Lake.

<sup>1</sup> NPR-A is the National Petroleum Reserve – Alaska, a 23 million acre area which is managed by the Bureau of Land Management.

## Teshkepuk Lake Case Study

The Alaska-Yukon Arctic ecoregion covers an area approximately 117,000 square miles in size. In order to compare biodiversity across the ecoregion, only data that were comprehensive to the ecoregion were used in the assessment. Thus, the data used in the assessment are at a coarse scale.

The applicability of coarse-scale data decreases as the size of the area being analyzed decreases. For this reason, we have restricted this study to questions about the relative biological importance of the sizeable Teshkepuk Lake area, which covers approximately 858,000 acres<sup>2</sup>. With the available ecoregional data we can identify species that are disproportionately represented in the area and quantify indices such as the relative biodiversity index, but we cannot locate specific places within Teshkepuk Lake that must be protected to conserve biodiversity.

We examined ecoregional data for the Teshkepuk Lake area to answer the following questions:

1. How does the biodiversity around Teshkepuk Lake compare to the biodiversity in the rest of the ecoregion?
2. How does the biodiversity around Teshkepuk Lake compare to the biodiversity in one subregion of the ecoregion – the Beaufort Coastal Plain?
3. Which species and ecological systems are most represented (that is, occur in disproportionately high concentrations) at Teshkepuk Lake?

### **1. Biodiversity of Teshkepuk Lake Relative to the Ecoregion**

Figure 2 illustrates the biological importance of the Teshkepuk Lake area relative to the rest of the ecoregion. The map is based on a relative biodiversity index (RBI) for the 85 primary conservation target species in the assessment.<sup>3</sup> Higher RBI scores (darker colors) indicate areas where there is either a greater *diversity* of species or a greater *concentration* of an individual species. In other words, a darker-shaded planning unit contains many different species, or it contributes relatively more to the total extent of one or more species' distributions.

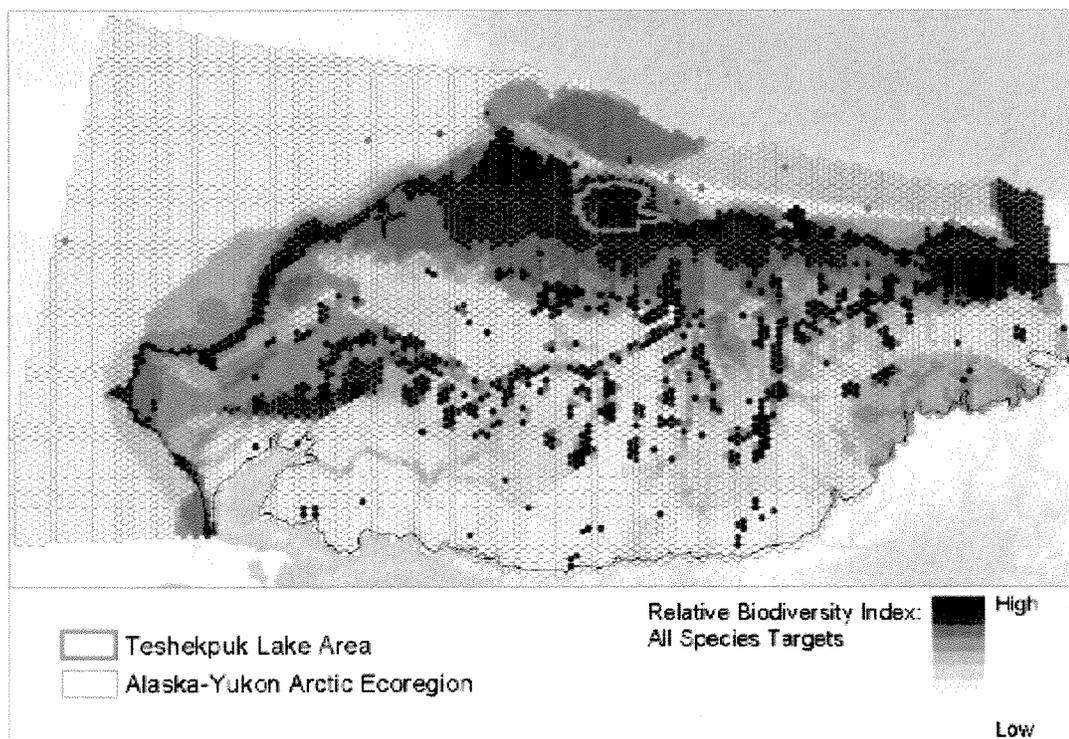
As is evident from the map in Figure 2, the Teshkepuk Lake area (outlined in blue) has a high RBI score. Of 82 Teshkepuk Lake area planning units (each comprised of 5,000 ha), 99% score above the 80<sup>th</sup> percentile in the RBI for the entire ecoregion, and two-thirds score in the top 10<sup>th</sup> percentile of the relative biodiversity index. Compared to the rest of the ecoregion, the Teshkepuk Lake area has a high relative biodiversity index score.

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<sup>2</sup> In our analysis, the Teshkepuk Lake area is defined using the boundaries of the existing Teshkepuk Lake Surface Protection Area, which covers 857,862 acres.

<sup>3</sup> See Update #5, *Conservation Targets*, for more details about which species are included.

**Figure 2.** Relative biodiversity index across ecoregion



## ***2. Biodiversity of Teshekpuk Lake Relative to the Beaufort Coastal Plain***

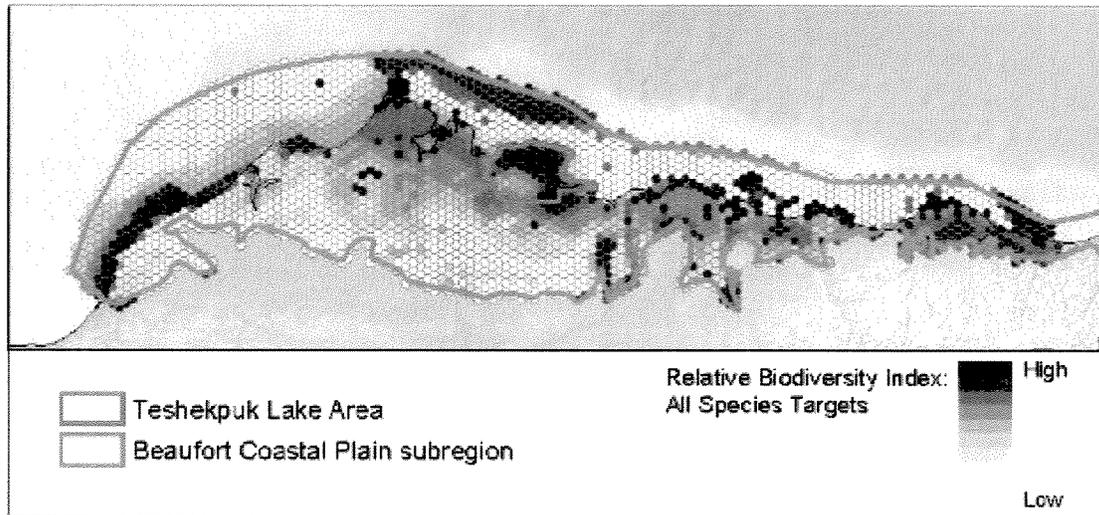
The Beaufort Coastal Plain is one of three major physiographic regions in the Alaska-Yukon Arctic ecoregion, and Teshekpuk Lake is located here. As shown by the darker shading in Figure 2 above, the Beaufort Coastal Plain has a high RBI relative to the rest of the ecoregion, suggesting that many species rely entirely or in part on the Beaufort Coastal Plain during their lifecycles.

But how biodiverse is Teshekpuk Lake relative to other areas in the Beaufort Coastal Plain? This answer to this question is illustrated in Figure 3, which depicts the gradient of biodiversity values across the Beaufort Coastal Plain. At this finer level of detail, a greater variation in biological importance across the Beaufort Coastal Plain can be distinguished.

Overall, 72% of the Teshekpuk Lake area rates above the 70<sup>th</sup> percentile of RBI for the Beaufort Coastal Plain, and over one-third of the area is in the top tenth percentile. Because the Coastal Plain already has a higher RBI than the rest of the ecoregion, the 72% figure demonstrates the very high biodiversity value of Teshekpuk Lake within the Beaufort Coastal Plain as well as the ecoregion as a whole.

Within the Teshekpuk Lake area itself, patterns of relative biodiversity are also noticeable. The northern and eastern portions of the Teshekpuk Lake area have very high relative biodiversity indices, and areas immediately southeast of the lake also have high values, although lower than in the north and east.

**Figure 3.** Relative biodiversity index across Beaufort Coastal Plain



### **3. Biological Importance of Teshekpuk Lake Area**

Results of the two preceding analyses reveal that Teshekpuk Lake contains high biodiversity, relative to both the ecoregion and the Beaufort Coastal Plain. By examining the underlying ecoregional data, it is possible to determine the makeup of the biodiversity of the Teshekpuk Lake area and calculate the relative importance of the Teshekpuk Lake area to the long-term viability of various species and ecological systems.

Of the 85 primary species targets included in the ecoregional assessment, 10 are heavily represented in the Teshekpuk Lake area<sup>4</sup>. Of these, three species targets (separated into five life-stage targets)—Teshekpuk Lake caribou, black brant, and geese—are very heavily represented; over 50% of their total distribution in the ecoregion occurs in the Teshekpuk Lake area. Yellow highlights in Table 1 indicate the five life-stage targets that are disproportionately represented in the Teshekpuk Lake area relative to their distribution across the rest of the ecoregion.

<sup>4</sup> The ten target species are partitioned into 18 life-stage targets; see Table 1.

**Table 1.** Representation of species targets at the Teshekpuk Lake area

<b>Target Species</b>	<b>Life Stage Target</b>	<b>Percentage of Ecoregional Distribution in the Teshekpuk Lake Area</b>
geese (black brant; Canada, white-fronted, and snow geese)	<i>molting concentrations</i>	100%
	<i>nesting concentrations</i>	20%
Teshekpuk Lake caribou	<i>mosquito relief area</i>	100%
	<i>calving area</i>	53%
	<i>oestrid fly relief area</i>	48%
	<i>summer area</i>	17%
	<i>wintering area</i>	3%
black brant	<i>nesting colonies</i>	46%
	<i>breeding density</i>	7%
Sabine's gull	<i>colonies</i>	45%
	<i>breeding density</i>	6%
ducks	<i>molting concentrations</i>	43%
	<i>nesting concentrations</i>	12%
spectacled eider	<i>breeding density</i>	8%
yellow billed loon	<i>breeding density</i>	4%
shorebirds	<i>breeding density</i>	5%
white fronted goose	<i>breeding density</i>	6%
long-tailed duck	<i>breeding density</i>	4%
<b>Total = 10</b>	<b>Total = 18</b>	

The data presented in the table above suggest that the Teshekpuk Lake area is of great significance to the sustainability of several species. Likewise, the Teshekpuk Lake area contributes significantly to the ecoregional distribution of several terrestrial ecosystems. Of thirty-six terrestrial ecosystem classes described in the Alaska-Yukon Arctic ecoregional assessment, four are particularly heavily represented in the Teshekpuk Lake area<sup>5</sup>. Coastal wet sedge tundra, lowland lake, coastal barrens, and coastal grass and dwarf shrub tundra each have over 10% of their ecoregional distribution in the Teshekpuk Lake area (see Table 2). Coastal barrens, in particular, comprise only 0.8% of the Coastal Plain, and 0.2% of the ecoregion overall, making this ecosystem type naturally rare in the ecoregion<sup>6</sup>. That over 20% of this rare ecosystem type is represented at Teshekpuk Lake is notable and suggests that the Teshekpuk Lake area may be an important area for conservation of this ecosystem type and its constituent species.

<sup>5</sup> See *Update #2: Predictive Terrestrial Ecosystem Model* for more information on terrestrial ecosystems.

<sup>6</sup> See *Update #2: Predictive Terrestrial Ecosystem Model* for more information on terrestrial ecosystems.

**Table 2.** Representation of Target Systems

<b>Target Systems</b>	<b>Percentage of Ecoregional Distribution in the Teshekpuk Lake Area</b>
coastal barrens	22%
coastal grass and dwarf shrub	19%
coastal wet sedge tundra	18%
lowland lake	12%
lowland wet sedge tundra	4%
riverine wet sedge tundra	1%
<b>Total = 6 terrestrial systems</b>	

The four ecosystems highlighted in yellow in Table 2 are also greatly underrepresented in the conservation network in the ecoregion; only 4% or less of each system's ecoregional distribution in the Coastal Plain is located on lands managed for conservation.<sup>7</sup>

### Limitations of Analyses Regarding Teshekpuk Lake

This study of the relative biodiversity of Teshekpuk Lake must be viewed in light of the limitations of the spatial data available. The analyses discussed in this update drew from datasets developed for the ecoregional assessment; therefore, this study is based only on data that is comprehensive to the entire Alaska-Yukon Arctic ecoregion. The data is typically at a coarse scale. In general, lack of spatial data may omit identification of some areas with greater biological importance. Of the three target species with the greatest representation in the Teshekpuk Lake area, for two—black brant and geese—the spatial data is incomplete for the ecoregion and may require updating.<sup>8</sup> For black brant, scientists have identified two important molting locations and have observed that up to 30% of all black brant molt north and east of Teshekpuk Lake (Derksen et al 1982). However, spatial data for brant molting only exists for Teshekpuk Lake with the brant grouped with other geese. Unlike the spatial data for brant and other geese, however, the data for the Teshekpuk Lake caribou herd provides a more complete picture of habitat use by the herd in most seasons and at a finer scale.

The applicability of coarse-scale data decreases as the size of the area being analyzed decreases. For this reason, we have restricted this study to questions about the relative biological importance of the Teshekpuk Lake area. With the available data we can identify species that are disproportionately represented in the area and quantify indices such as the RBI. We can therefore prioritize areas for biodiversity significance, but we must then use conservation area planning, which is at a finer scale, to identify specific strategies and places for conservation within areas such as Teshekpuk Lake.

<sup>7</sup> See *Update #3: Gap Analysis of Terrestrial Ecosystems* for more on the classification of lands managed for conservation and the conservation status of terrestrial ecosystems in the Alaska-Yukon Arctic ecoregion.

<sup>8</sup> See *Update #8: Assessment Limitations and Data Gaps* for more information about spatial data gaps for the species targets highlighted in this analysis.

## Contacts

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## Previous Updates on the Alaska-Yukon Arctic Ecoregional Assessment

Update #1: Project Description  
Update #2: Predictive Terrestrial Ecosystem Model  
Update #3: Gap Analysis of Terrestrial Ecosystems  
Update #4: Freshwater Ecosystem Model  
Update #5: Conservation Targets  
Update #6: Coastal Ecosystem Model  
Update #7: Environmental Change Model  
Update #8: Assessment Limitations and Data Gaps  
Update #9: Cost Suitability Index  
Update #10: Decision Support Tool  
To obtain these updates, visit [www.nature.org/alaska](http://www.nature.org/alaska).

## The Nature Conservancy

The Nature Conservancy is an international non-profit conservation organization that seeks to preserve the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Ecoregional assessments employ a science-based approach to evaluate the biodiversity significance of landscapes. For the Alaska-Yukon Arctic, our goal is to gather sufficient information to identify areas of biological significance, evaluate current and potential stresses to biodiversity, and develop appropriate and constructive conservation strategies to ameliorate threats in special areas.