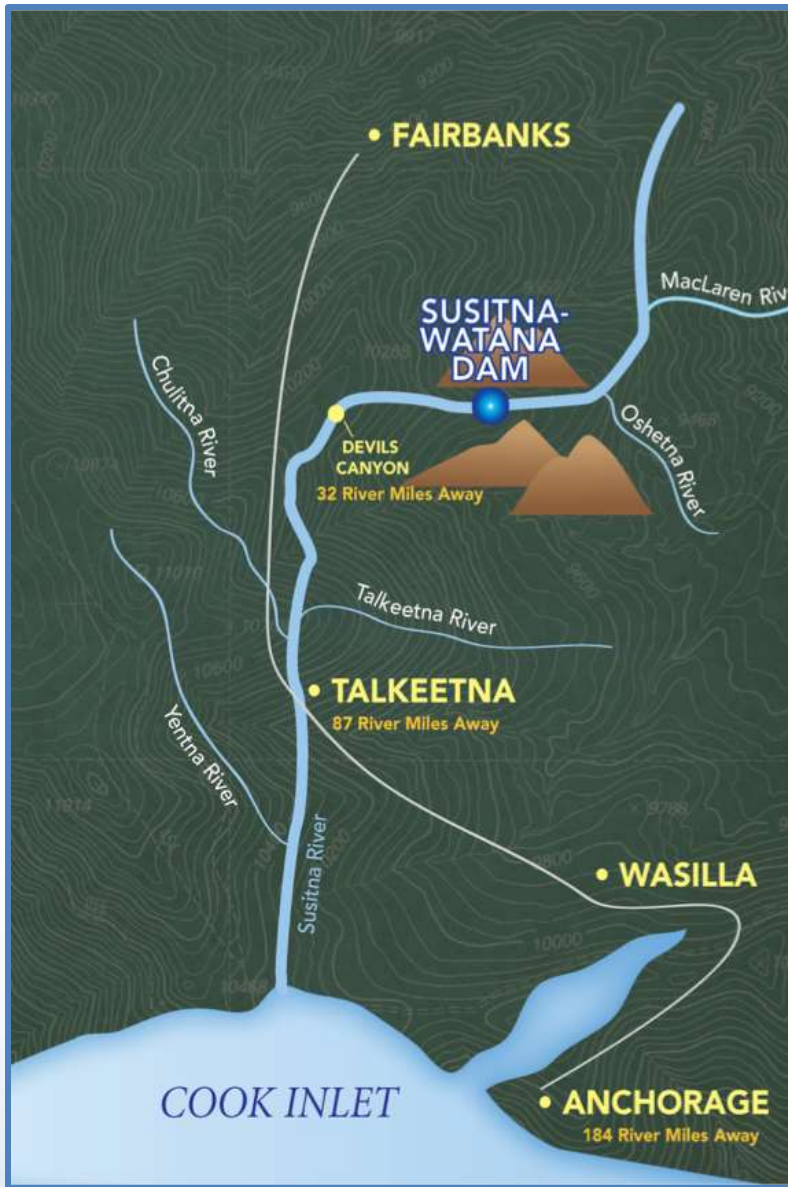# Riparian IFS Technical Meeting Day Two

Conceptual Approach for Assessing Post-development Changes in Riparian Wildlife Habitats

April 30, 2014

Prepared by
ABR, Inc.—Environmental Research & Services

Why Assess Habitats?

- *Predicting quantitative changes in population levels for species of birds, mammals, and amphibians in downstream riparian areas post-development likely would be subject to high levels of inaccuracy given the number of variables involved in regulating population numbers.*

- *We can, however, model quantitative changes in the areal coverage of wildlife habitats and habitat values for wildlife by making use of the modeling of post-development changes in ITU variables (ITU variables will be used to derive riparian wildlife habitats for pre- and post-development periods).*

Methods from the Evaluation of Wildlife Habitat Use (Study 10.19)

- *Existing wildlife habitats will be mapped in riparian areas in the riparian vegetation study (Study 11.6)*

- *Each mapped habitat type then will be ranked categorically for habitat values (high, moderate, low, negligible) for each bird and mammal species selected for analysis (Study 10.19)*

- *Ranking produces a pre-development matrix of habitat values for each mapped habitat and wildlife species*

- *Habitat evaluations then will be replicated for the habitats expected to occur after a substantial amount of time (e.g., 50 years) post-development; changes in habitats will be based on the riparian modeling results*

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Metrics to Assess Habitat Change

- *Changes in Habitat Values for Individual Species and Species Groups: Using a GIS, sets of pre- and post-development wildlife habitats and habitat values for wildlife species will be used to produce quantitative measures of changes in the areal coverage of habitats categorized as high, moderate, low, and negligible value for individual wildlife species and species groups.*

- *Using Habitat Values to Assess Possible Changes in Species Richness: For those species with high and moderate habitat-value rankings (i.e., habitats are regularly used), predicted changes in species richness between pre- and post-development periods can be assessed to evaluate changes in all riparian habitats combined or in a subsets of habitats.*

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Habitat-use Evaluation: Selection of Mammal Species

- *Mammal species will be selected for evaluation if they meet one or more of three criteria (Study 10.19):*

  1. *Management concern for federal and/or state management agencies (primarily game and furbearer species)*

  2. *Important subsistence resource or is culturally significant for Alaska Natives*

  3. *Ecologically important with demonstrable ecosystem effects, such as ecosystem engineers (e.g., beaver) and species that occupy prominent positions in the trophic structure as prey or predators (e.g., prominent herbivores and carnivores; abundant small mammals and furbearers)*

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Habitat-use Evaluation: Selection of Bird Species

- *All bird species known to occur in riparian habitats along the Susitna River will be evaluated*
  - *It can be challenging to get ornithologists to agree about which species should be selected for analysis and which should be omitted, with the sense that some important species will not be evaluated*
  - *Easier to avoid this problem altogether and simply rank all species known to occur in the region*
  - *Species richness assessments are more instructive when all species are assessed*

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Habitat-use Evaluation: General Approach

- *Habitat use by birds and mammals in riparian areas downstream of the proposed dam will be assessed using site-specific data whenever possible; APA Project and other survey data are expected to be available for some species, but not all species*

- *Otherwise, habitat-use information in the scientific literature for interior and south-central Alaska will be used*

- *In cases in which limited data or supporting literature are available, professional judgment will be employed based on extensive survey experience with birds and mammals in interior and south-central Alaska*

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Habitat-use Evaluation: Methods (I)

- *If data are available, overlay field observation locations on habitat map polygons to identify habitat types being used at the time of observation*

- *Assess frequency of use of each habitat type by each species from field observations*

- *Evaluate survey data coverage to determine which habitats and/or species were adequately sampled, undersampled, or unsampled*

- *For undersampled and unsampled habitats and species, augment field observations with information on habitat use derived from (1) the scientific literature, and/or (2) professional judgment based on field work elsewhere in interior and south-central Alaska*

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Habitat-use Evaluation: Methods (II)

- *When using the scientific literature, cross-walk habitats recorded as being used in previous studies with the habitat types mapped in the riparian vegetation study (Study 11.6) to identify which currently mapped habitats are high, moderate, low, or negligible value for each species*

- *For herbivorous and omnivorous mammals, evaluate percent cover of preferred forage species in each mapped habitat type, using detailed field data collected for the riparian vegetation study (Study 11.6)*

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Habitat-use Evaluation: Methods (III) – Birds

Habitat-value Class	Ranking Score	Description
High	3	Known to be frequently used for nesting and/or foraging during the breeding season; these habitats are also often used during migration
Moderate	2	Moderate-value habitats would be regularly used during the breeding and/or migration seasons, but less so than high-value habitats
Low	1	Low-value habitats would see little use by the species under consideration
Negligible	0	The species is not expected to occur, or will occur very rarely, in negligible-value habitats

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Habitat-use Evaluation: Methods (IV) – Mammals

Habitat-value Class	Ranking Score	Description
High	3	Known to be frequently used for breeding, calving, denning, etc., and/or foraging during critical seasons
Moderate	2	Moderate-value habitats would be regularly used (e.g., especially for foraging) but less so than high-value habitats
Low	1	Low-value habitats would see little use by the species under consideration
Negligible	0	The species is not expected to occur, or will occur very rarely, in negligible-value habitats

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Conceptual Example of Habitat Value Ranking for Individual Species

Species	Alpine Dry Barrens	Alpine Moist Dwarf Scrub	Alpine Moist Graminoid–Forb Meadow	Alpine Wet Dwarf Shrub–Sedge Scrub	Upland Dry Barrens	Upland Dry Dwarf Shrub–Lichen Scrub	Upland Moist Dwarf Scrub	Upland Moist Low Willow Scrub	Upland Moist Tall Alder Scrub	Upland Moist Tall Willow Scrub	Upland and Lowland Spruce Forest	Upland and Lowland Moist Mixed Forest	Rivers and Streams	Rivers and Streams (Anadromous)	Riverine Barrens	Riverine Wet Graminoid–Shrub Meadow	Riverine Low Willow Scrub	Riverine Tall Alder or Willow Scrub	Riverine Moist Mixed Forest	Lakes and Ponds	Lacustrine Moist Barrens	Lowland Sedge–Forb Marsh	Lowland Ericaceous Scrub Bog	Lowland Wet Graminoid–Shrub Meadow	Lowland Low and Tall Willow Scrub
Tundra Swan						3	3						2	2		2				3		3	2	3	
Harlequin Duck													3	3	2	3	3	2	2						
Surf Scoter																				3					
Black Scoter								3	2											3		3	3	3	
Long-tailed Duck							2	3	3								2	2		3		3	3	3	
Willow Ptarmigan		3						3	3	3	3							2	2					2	3
Rock Ptarmigan	3	3			2	2	2																		
Red-throated Loon																				2					
Common Loon																				3		3		3	
Bald Eagle													2	3	2				3	2					
Northern Goshawk												2								3					
Golden Eagle	3	2	2	2	2	3	3	3				2	2	2		2						2	2	2	2
Merlin									2		2	2	2	2		2			3	2					
Gyrfalcon	3	3	2	2		3	2	2					2	2		2	2					2	2	2	2
Peregrine Falcon													2	2						2					
American Golden-Plover		3		2		3	3																3	3	
Lesser Yellowlegs												2	2	2		2		2		3		3	3	3	2
Whimbrel								2								2							3	3	

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Conceptual Example of Species Richness Assessment by Habitat

Species	Alpine Dry Barrens	Alpine Moist Dwarf Scrub	Alpine Moist Graminoid–Forb Meadow	Alpine Wet Dwarf Shrub–Sedge Scrub	Upland Dry Barrens	Upland Dry Dwarf Shrub–Lichen Scrub	Upland Moist Dwarf Scrub	Upland Moist Low Willow Scrub	Upland Moist Tall Alder Scrub	Upland Moist Tall Willow Scrub	Upland and Lowland Spruce Forest	Upland and Lowland Moist Mixed Forest	Rivers and Streams	Rivers and Streams (Anadromous)	Riverine Barrens	Riverine Wet Graminoid–Shrub Meadow	Riverine Low Willow Scrub	Riverine Tall Alder or Willow Scrub	Riverine Moist Mixed Forest	Lakes and Ponds	Lacustrine Moist Barrens	Lowland Sedge–Forb Marsh	Lowland Ericaceous Scrub Bog	Lowland Wet Graminoid–Shrub Meadow	Lowland Low and Tall Willow Scrub
Tundra Swan						3	3						2	2		2				3		3	2	3	
Harlequin Duck													3	3	2	3	3	2	2						
Surf Scoter																				3					
American Scoter						3		2												3		3	3	3	
Long-tailed Duck						2	3	3									2	2		3		3	3	3	
Willow Ptarmigan		3					3	3	3	3							2	2					2		3
Rock Ptarmigan	3	3			2	2	2																		
Red-throated Loon																					2				
Common Loon																				3		3		3	
Bald Eagle													2	3	2				3	2					
Northern Goshawk												2							3						
Golden Eagle	3	2	2	2	2	3	3	3				2	2	2		2						2	2	2	2
Merlin									2		2	2	2	2		2			3	2					
Gyrfalcon	3	3	2	2		3	2	2					2	2		2	2					2	2	2	2
Peregrine Falcon													2	2						2					
American Golden-Plover		3		2		3	3																3	3	
Lesser Yellowlegs											2		2	2		2		2		3		3	3	3	2
Whimbrel							2									2							3	3	

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Mapping of Riparian Wildlife Habitats Will Use ITU Approach

- *Wildlife habitats will be derived using an ITU approach similar to that used to derive ecotypes in the riparian vegetation study (Draft ISR Study 11.6, Section 4.3.1)*

- *Wildlife habitats will be derived after the ITU mapping is completed and all multivariate ITU combinations are available for analysis*

- *Post-development wildlife habitats will be derived by combining the predicted altered states for each ITU variable to yield multivariate ITU combinations and then deriving a new set of expected post-development habitat types*

- *The following examples of wildlife habitats and wildlife habitat values for birds and mammals are <u>conceptual only </u>to illustrate how the change-assessment method will work*

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Hypothetical Changes in Riparian Wildlife Habitats Post-Development

Possible Habitat, Year 1 *		Possible Habitat, Year 50 *
Human Modified	--->	Human Modified
Clearwater Tributary Stream	--->	Clearwater Tributary Stream
Glacial River	--->	Glacial River
Riverine Barrens	--->	Riverine Sapling Poplar-Alder-Willow Scrub
Riverine Beaver Pond	--->	Riverine Wet Sedge-Forb Marsh
Riverine Wet Sedge-Forb Marsh	--->	Riverine Bluejoint-Herb Meadow
Riverine Bluejoint-Herb Meadow	--->	Riverine Bluejoint-Herb Meadow
Riverine Tall Herb Meadow	--->	Riverine Birch Forest
Riverine Birch Forest	--->	Riverine Spruce-Birch Forest
Riverine Spruce-Birch Forest	--->	Riverine Spruce-Birch Forest
Riverine Spruce Forest	--->	Riverine Spruce Forest
Riverine Spruce-Poplar Forest	--->	Riverine Spruce-Poplar Forest
Riverine Tall Alder-Willow Scrub	--->	Riverine Pole-sized Poplar Forest
Riverine Sapling Poplar-Alder-Willow Scrub	--->	Riverine Pole-sized Poplar Forest
Riverine Pole-sized Poplar Forest	--->	Riverine Timber-sized Poplar Forest
Riverine Timber-sized Poplar Forest	--->	Riverine Large-tree Poplar Forest
Riverine Large-tree Poplar Forest	--->	Riverine Large-tree Poplar Forest

* Pre- and post-development habitats were derived for this presentation as conceptual examples using professional judgment only; no ITU analysis or habitat change modeling has yet been conducted.

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Conceptual Wildlife Habitats, Pre-Development

Possible Habitats - Year 1

- Human Modified
- Glacial River
- Riverine Barrens
- Riverine Beaver Pond
- Riverine Wet Sedge-Forb Marsh
- Riverine Tall Herb Meadow
- Riverine Birch Forest
- Riverine Spruce-Birch Forest
- Riverine Spruce Forest
- Riverine Spruce-Poplar Forest
- Riverine Tall Alder-Willow Scrub
- Riverine Sapling Poplar-Alder-Willow Scrub
- Riverine Pole-sized Poplar Forest
- Riverine Timber-sized Poplar Forest
- Riverine Large-tree Poplar Forest
- Undifferentiated, Not Mapped
- Proposed Project Area

DENALI STATE PARK

GOLD CREEK

Gold Creek

Alaska Railroad

ALASKA ENERGY AUTHORITY

0   0.5   1 mi

Projection: AK State Plane Zone 4 NAD 1983
Date Created: 4/10/2014
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File: SuWa_ABR_Hab_Change_Habitat_yr1_2014.mxd

Conceptual Wildlife Habitats, 50 Years Post-Development

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Possible Habitats - Year 50

- Human Modified
- Glacial River
- Riverine Wet Sedge-Forb Marsh
- Riverine Birch Forest
- Riverine Spruce-Birch Forest
- Riverine Spruce Forest
- Riverine Spruce-Poplar Forest
- Riverine Sapling Poplar-Alder-Willow Scrub
- Riverine Pole-sized Poplar Forest
- Riverine Timber-sized Poplar Forest
- Riverine Large-tree Poplar Forest
- Undifferentiated, Not Mapped
- Proposed Project Area

ALASKA ENERGY AUTHORITY

0   0.5   1 mi

Projection: AK State Plane Zone 4 NAD 1983
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Conceptual Habitat Values for Bird Species "A"

Riverine Beaver Pond
Riverine Spruce-Birch Forest
Riverine Spruce-Poplar Forest — **High Value**
Riverine Spruce Forest
Riverine Large-tree Poplar Forest

Clearwater Tributary Stream
Glacial River
Riverine Barrens — **Moderate Value**
Riverine Birch Forest
Riverine Timber-sized Poplar Forest

Riverine Wet Sedge-Forb Marsh
Riverine Tall Alder-Willow Scrub — **Low Value**
Riverine Sapling Poplar-Alder-Willow Scrub
Riverine Pole-sized Poplar Forest

Human Modified
Riverine Bluejoint-Herb Meadow — **Negligible Value**
Riverine Tall Herb Meadow

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Conceptual Habitat Values for Bird Species "A", Pre-Development

Species A - Year 1

- ⬛ Negligible
- 🟨 Low
- 🟧 Moderate
- 🟥 High
- ⬜ Not Assessed
- Proposed Project Area
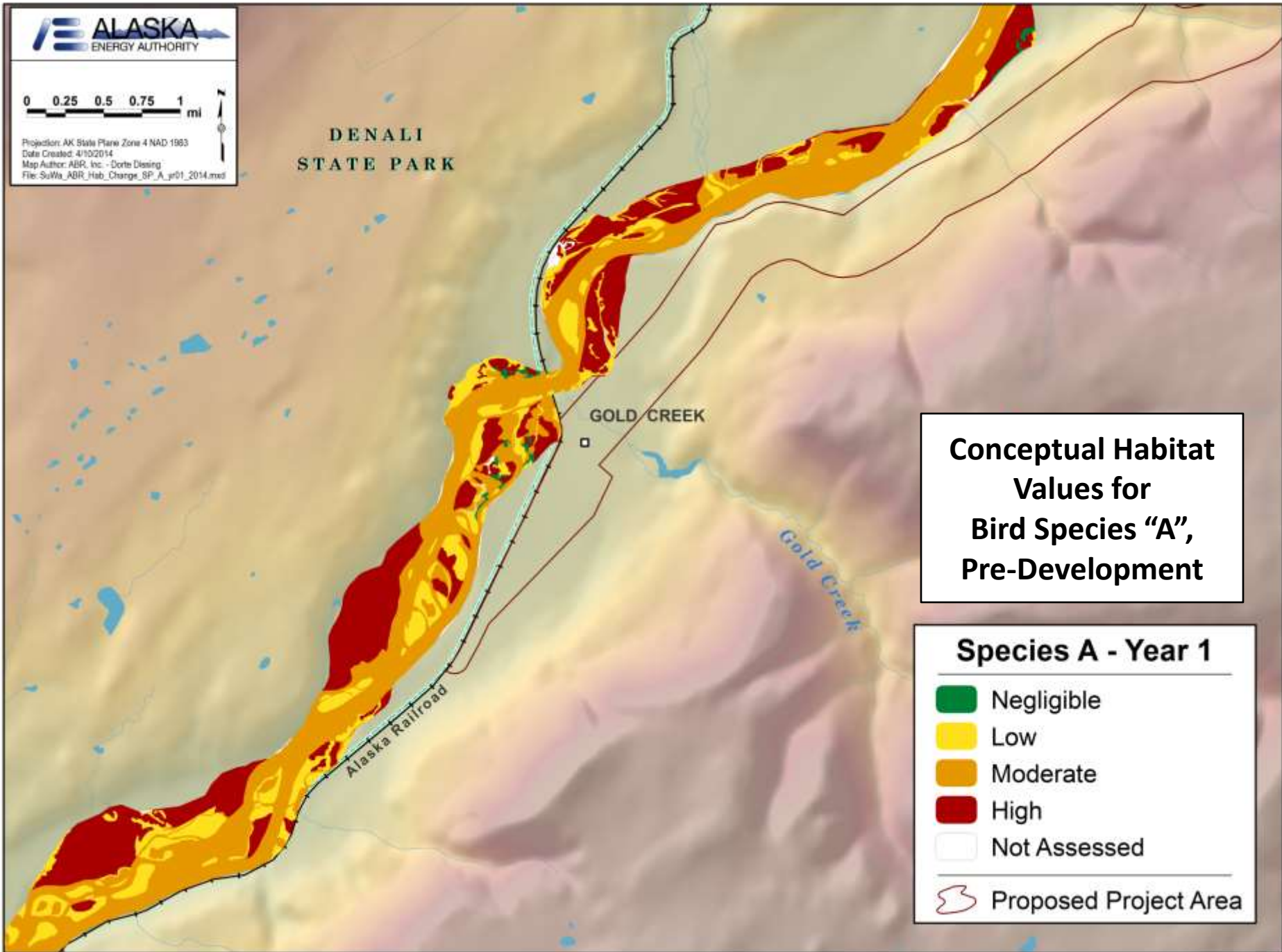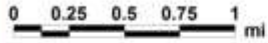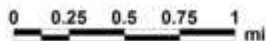
Conceptual Habitat Values for Bird Species "A", 50 Years Post-Development

Species A - Year 50

- Negligible
- Low
- Moderate
- High
- Not Assessed
- Proposed Project Area

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0   0.25   0.5   0.75   1 mi

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Conceptual Habitat Values for Bird Species "B"

Riverine Tall Alder-Willow Scrub
Riverine Sapling Poplar-Alder-Willow Scrub   **High Value**
Riverine Pole-sized Poplar Forest

Riverine Birch Forest
Riverine Spruce-Birch Forest
Riverine Spruce Forest
Riverine Spruce-Poplar Forest   **Moderate Value**
Riverine Timber-sized Poplar Forest
Riverine Large-tree Poplar Forest

Human Modified
Clearwater Tributary Stream
Glacial River
Riverine Barrens
Riverine Beaver Pond   **Negligible Value**
Riverine Wet Sedge-Forb Marsh
Riverine Bluejoint-Herb Meadow
Riverine Tall Herb Meadow

(None ranked as Low Value)
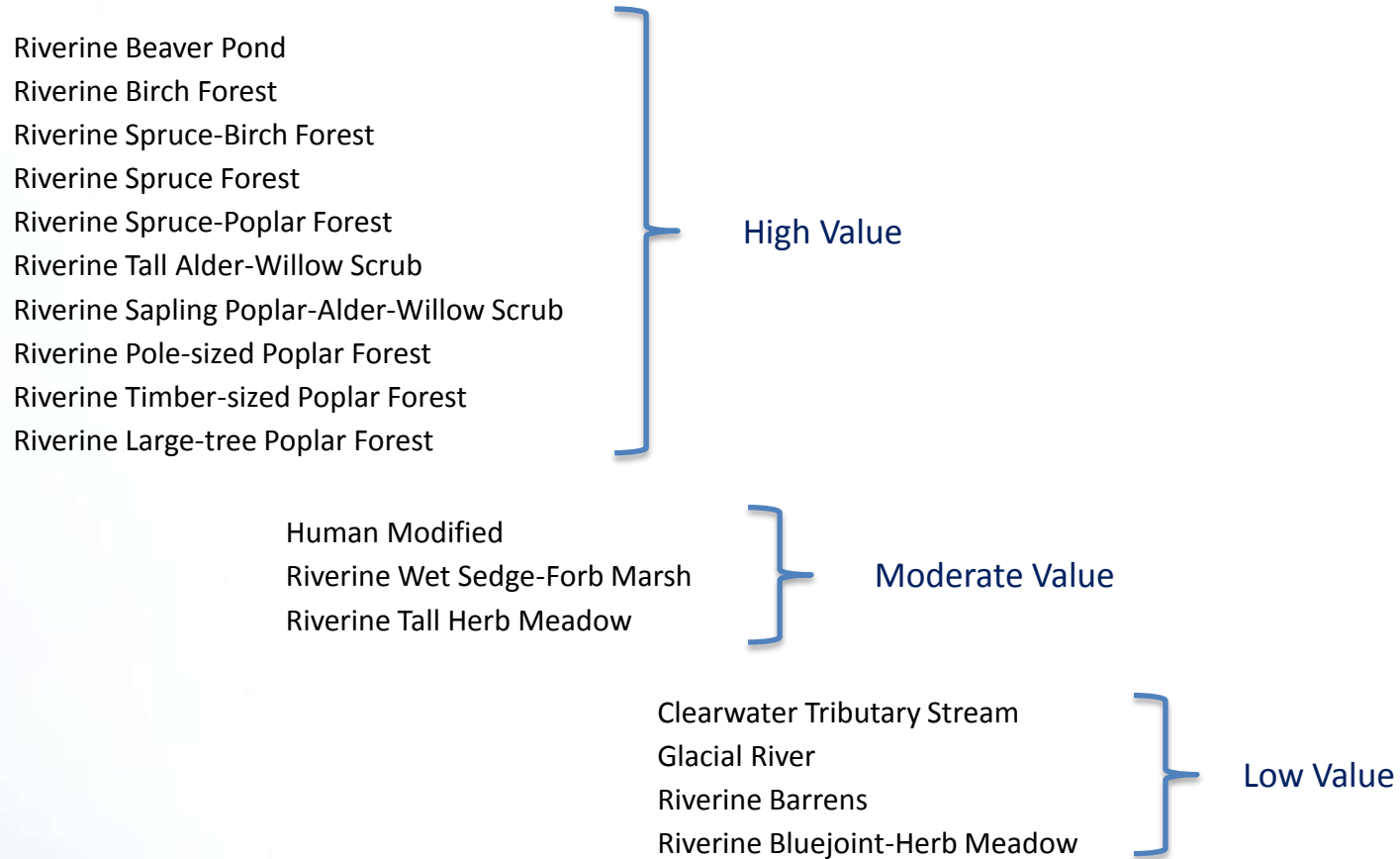
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Conceptual Habitat Values for Bird Species "B", Pre-Development

Species B - Year 1

- Negligible
- Low
- Moderate
- High
- Not Assessed
- Proposed Project Area
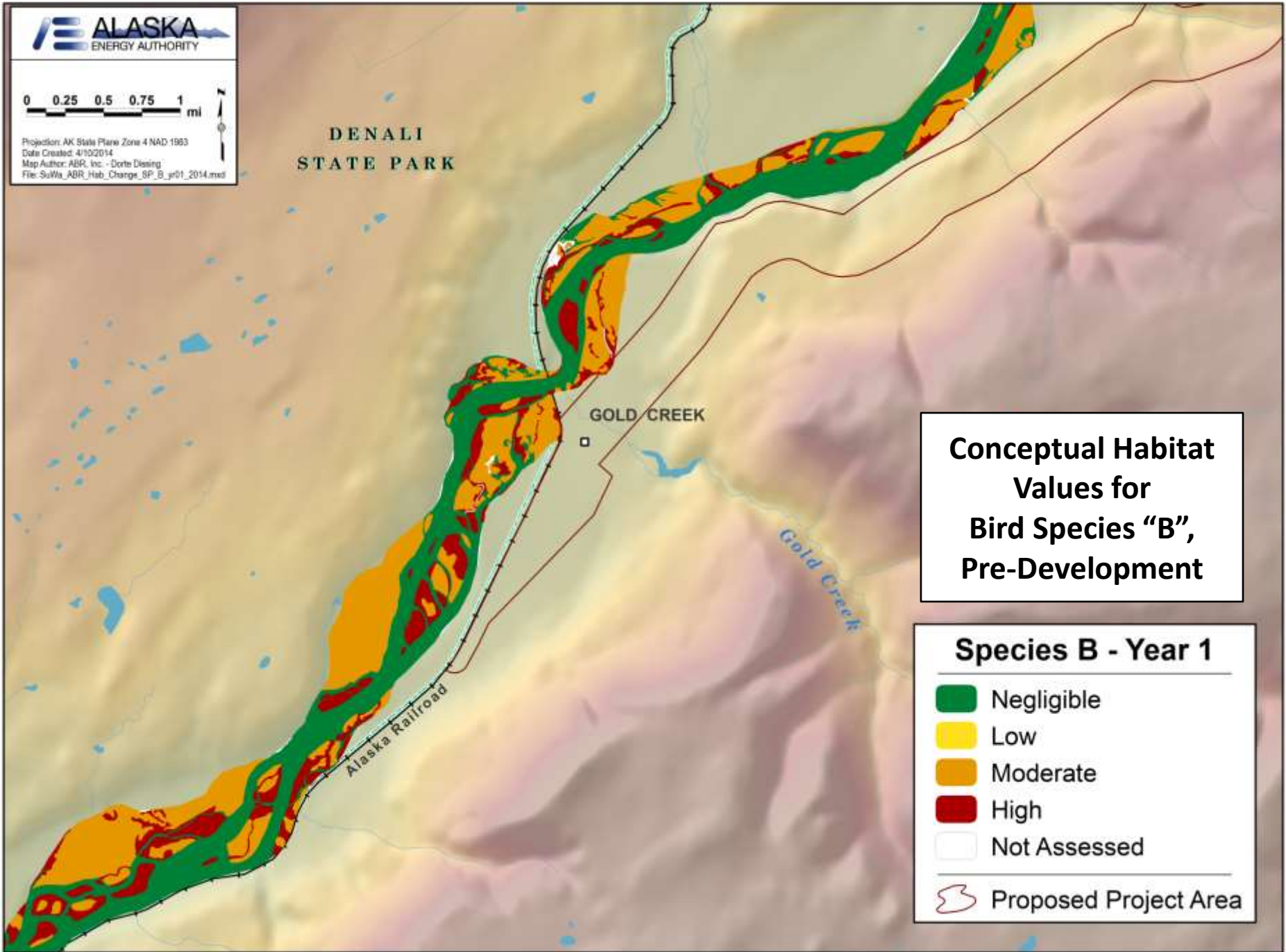
ALASKA ENERGY AUTHORITY

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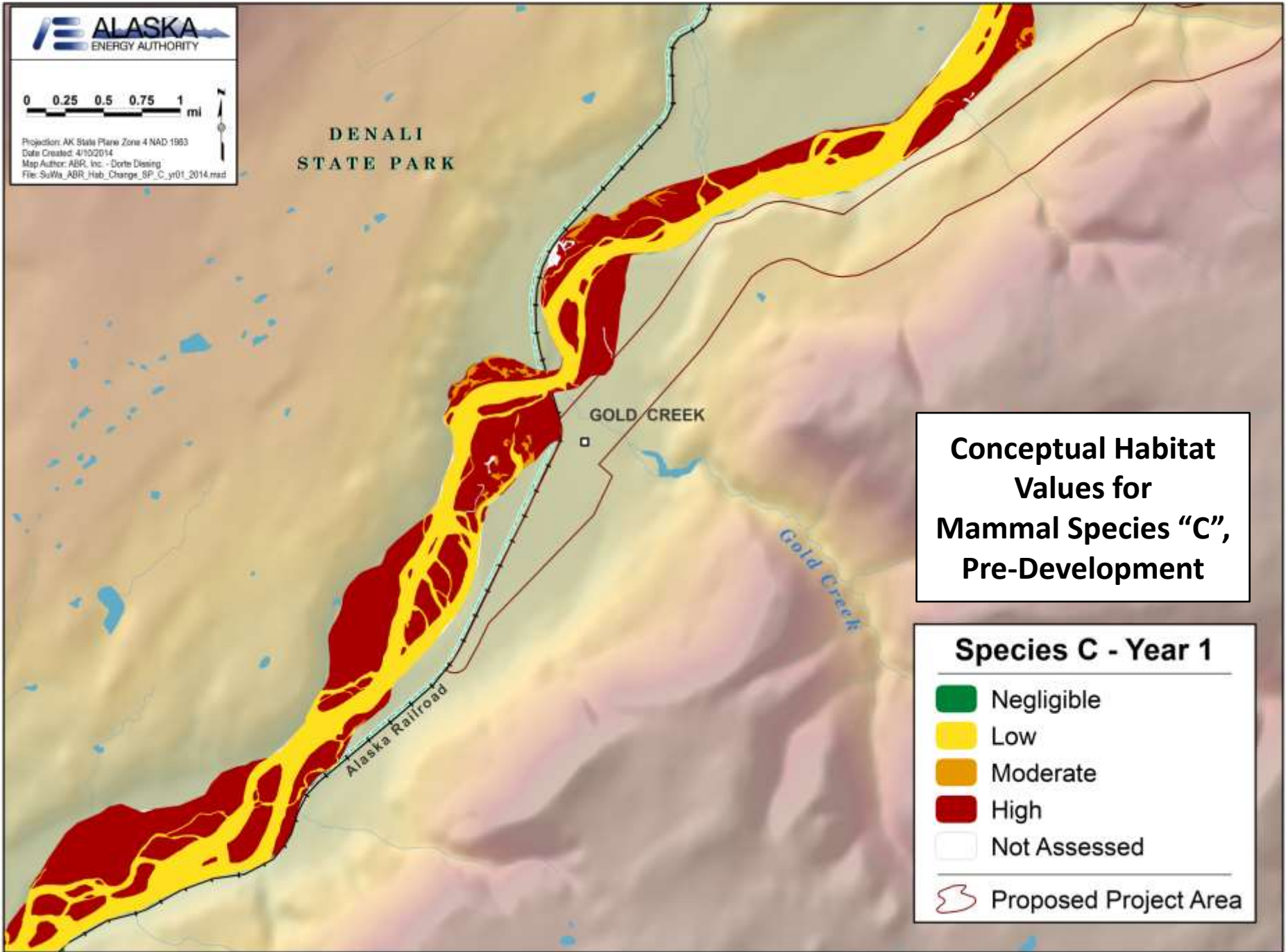File: SuWa_ABR_Hab_Change_SP_B_yr50_2014.mxd
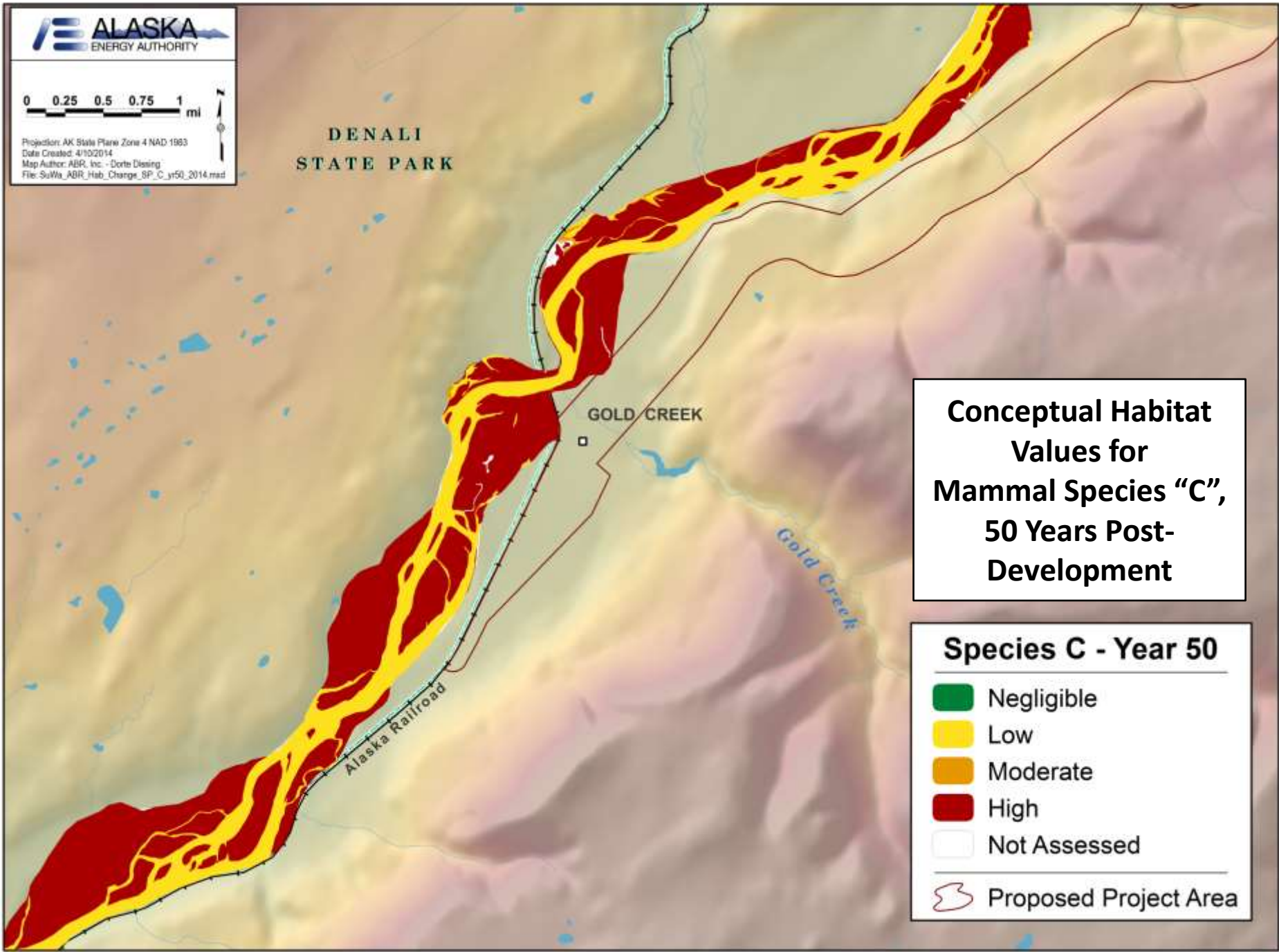
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Conceptual Habitat Values for Bird Species "B", 50 Years Post-Development

Species B - Year 50

Negligible
Low
Moderate
High
Not Assessed

Proposed Project Area

Conceptual Habitat Values for Mammal Species "C"

Riverine Beaver Pond
Riverine Birch Forest
Riverine Spruce-Birch Forest
Riverine Spruce Forest
Riverine Spruce-Poplar Forest   **High Value**
Riverine Tall Alder-Willow Scrub
Riverine Sapling Poplar-Alder-Willow Scrub
Riverine Pole-sized Poplar Forest
Riverine Timber-sized Poplar Forest
Riverine Large-tree Poplar Forest

Human Modified
Riverine Wet Sedge-Forb Marsh   **Moderate Value**
Riverine Tall Herb Meadow

Clearwater Tributary Stream
Glacial River   **Low Value**
Riverine Barrens
Riverine Bluejoint-Herb Meadow

(None ranked as Negligible Value)

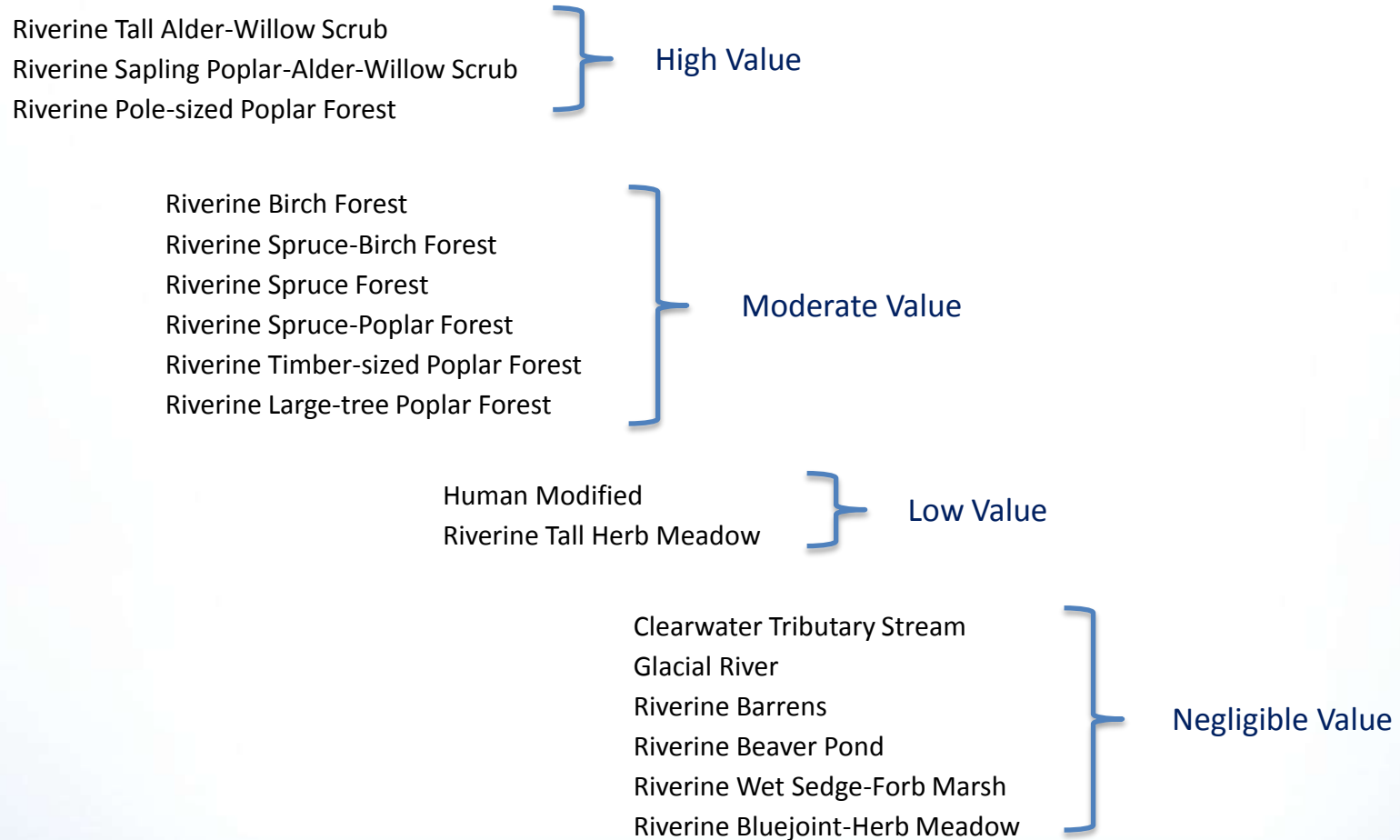**SUSITNA-WATANA HYDRO**   *Clean, reliable energy for the next 100 years.*

Conceptual Habitat Values for Mammal Species "C", Pre-Development

Species C - Year 1

- Negligible
- Low
- Moderate
- High
- Not Assessed
- Proposed Project Area

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GOLD CREEK

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ALASKA ENERGY AUTHORITY

0   0.25   0.5   0.75   1 mi

Projection: AK State Plane Zone 4 NAD 1983
Date Created: 4/10/2014
Map Author: ABR, Inc. - Dorte Dissing
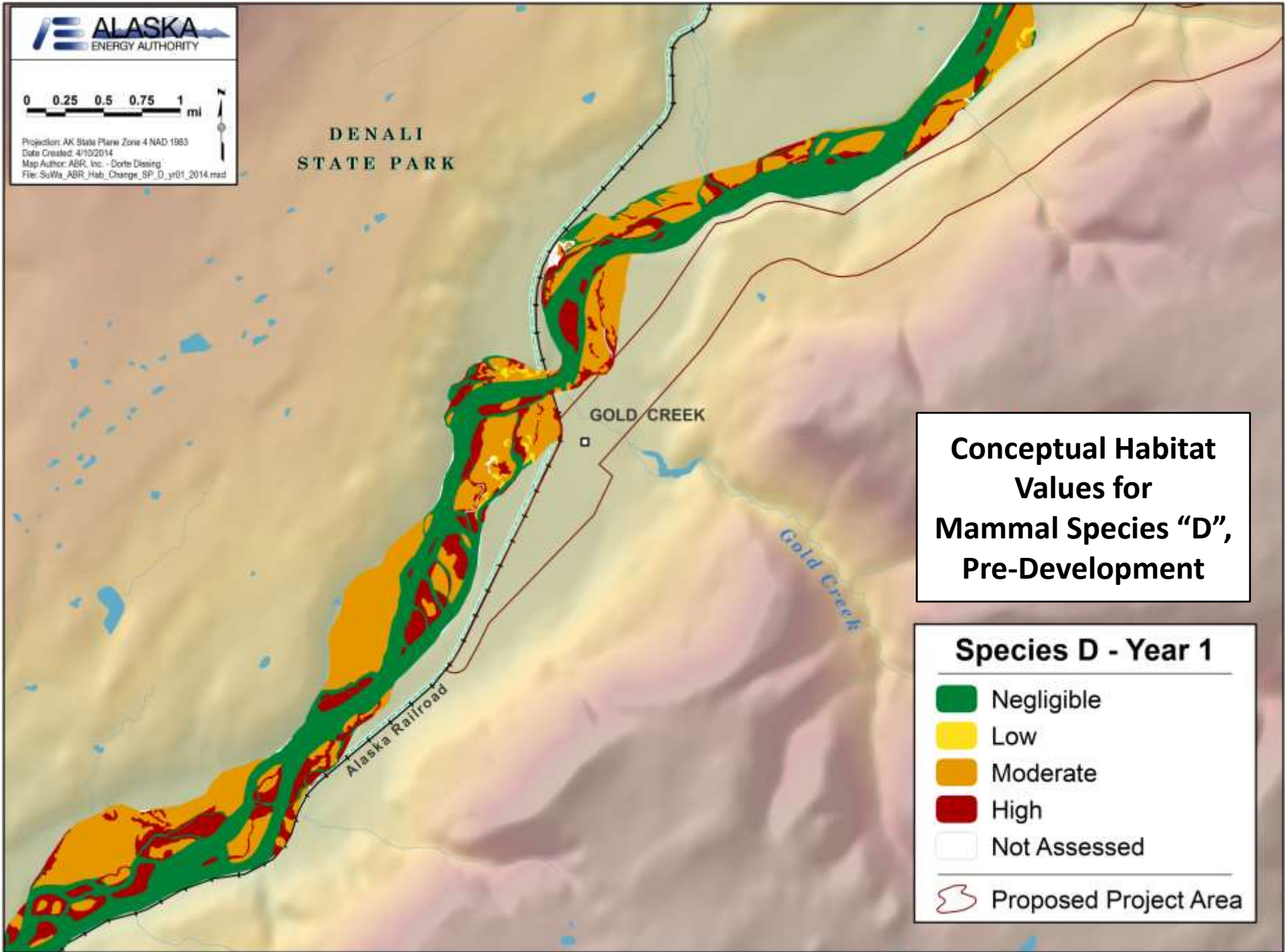File: SuWa_ABR_Hab_Change_SP_C_yr01_2014.mxd

Conceptual Habitat Values for Mammal Species "C", 50 Years Post-Development

Species C - Year 50

- Negligible
- Low
- Moderate
- High
- Not Assessed

Proposed Project Area

DENALI STATE PARK

GOLD CREEK

Gold Creek

Alaska Railroad

ALASKA ENERGY AUTHORITY

0 0.25 0.5 0.75 1 mi

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File: SuWa_ABR_Hab_Change_SP_C_yr50_2014.mxd

Conceptual Habitat Values for Mammal Species "D"

Riverine Tall Alder-Willow Scrub
Riverine Sapling Poplar-Alder-Willow Scrub
Riverine Pole-sized Poplar Forest

High Value

Riverine Birch Forest
Riverine Spruce-Birch Forest
Riverine Spruce Forest
Riverine Spruce-Poplar Forest
Riverine Timber-sized Poplar Forest
Riverine Large-tree Poplar Forest

Moderate Value

Human Modified
Riverine Tall Herb Meadow

Low Value

Clearwater Tributary Stream
Glacial River
Riverine Barrens
Riverine Beaver Pond
Riverine Wet Sedge-Forb Marsh
Riverine Bluejoint-Herb Meadow

Negligible Value
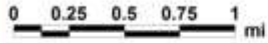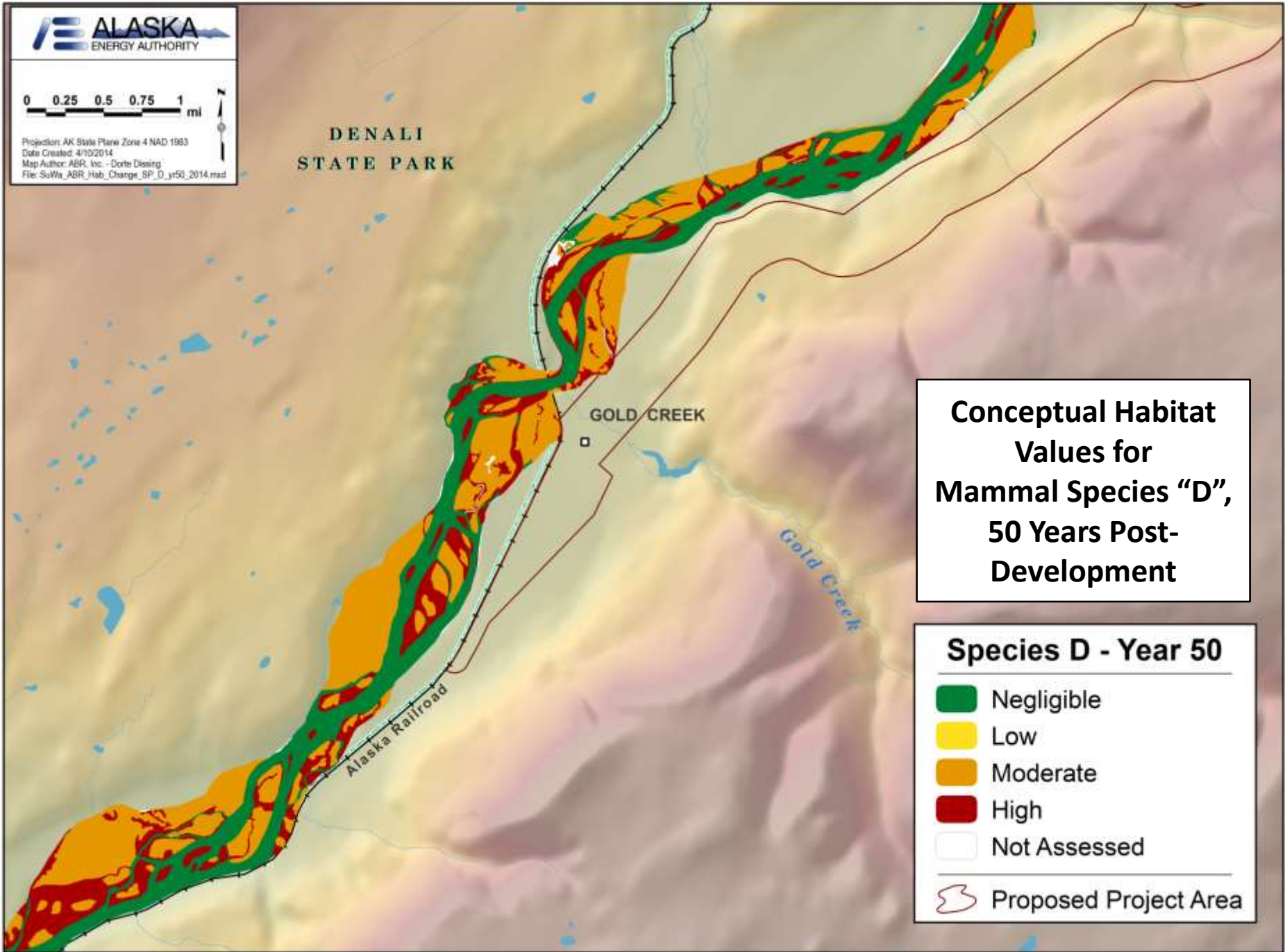
Conceptual Habitat Values for Mammal Species "D", Pre-Development

Species D - Year 1
- Negligible
- Low
- Moderate
- High
- Not Assessed
- Proposed Project Area

Conceptual Habitat Values for Mammal Species "D", 50 Years Post-Development

Questions? Comments?