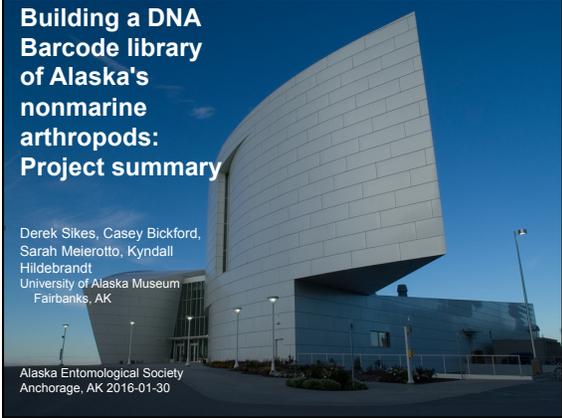
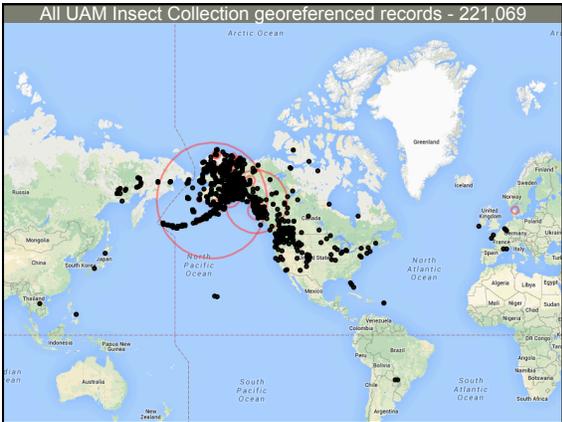


Building a DNA Barcode library of Alaska's nonmarine arthropods: Project summary

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Mission

To create a resource that makes publicly available as much information as possible concerning the non-marine arthropods of Alaska.

Using specimens + literature + 'grey' literature

Which species occur in Alaska?

Where do these species occur?

What do they do? / Are they changing?

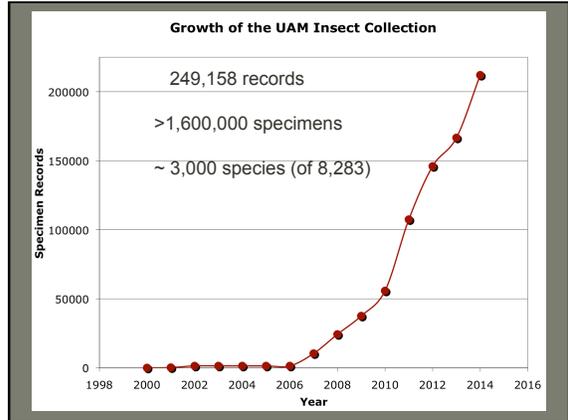
Mission

Which species occur in Alaska?

~8,300 nonmarine arthropod species

USFWS Alaska Region NWRS Inventory and Monitoring Initiative

- hope to use DNA Barcode methods for monitoring
- must first build a DNA Barcode library for Alaska's arthropod species



Methods

Plan:
Contribute to iBoL, DNA Barcodes of

2-3 specimens per authoritatively identified species
< 10yrs old

~2,000 species, >4,000 specimens

Test the library by using it to identify unknowns



DNA Barcoding – test of the library

10 plates of legs sent of unidentified specimens
Coleoptera, Hymenoptera, Diptera

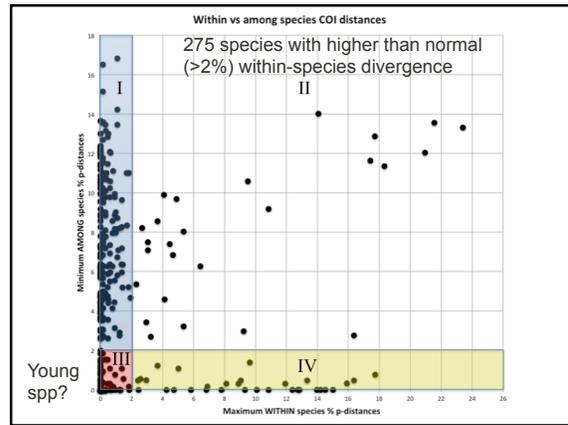
specimens sent	950	
Barcodes	601 (241 BINs)	
ID improvement	562	
Confident species IDs	161 (27% of 601)	
number of confident spp IDs / No. succ barcoded		
Coleoptera	13 / 82	15%
Hymenoptera	85 / 338	25%
Diptera	62 / 181	34%

BIN Discordance... (Barcode Index Numbers(BIN): cluster barcode sequences to create OTUs that closely reflect species groupings)

UAMIC	Species	Species	BOLD	Count	OTUs
UAMIC409-13	<i>Carterocephalus palmeri</i>	<i>Carterocephalus palmeri</i>	Species BOLD:AA6267	101	<i>Carterocephalus palmeri</i> [33], <i>Carterocephalus silvicolae</i> [5]
UAMIC1668-13	<i>Centromerus nr. longibulbus</i>	<i>Centromerus nr. longibulbus</i>	Species BOLD:AA6230	4	<i>Centromerus longibulbus</i> [3], <i>Centromerus nr. longibulbus</i> [1]
UAMIC176-13	<i>Cephaloon bicolor</i>	<i>Cephaloon bicolor</i>	Species BOLD:AAQ032	13	<i>Cephaloon bicolor</i> [3], <i>Cephaloon lepidoides</i> [1]
UAMIC271-13	<i>Cephaloon bicolor</i>	<i>Cephaloon bicolor</i>	Species BOLD:AAQ032	13	<i>Cephaloon bicolor</i> [3], <i>Cephaloon lepidoides</i> [1]
UAMIC1234-13	<i>Cephalops fumaceus</i>	<i>Cephalops fumaceus</i>	Species BOLD:AAQ1858	22	<i>Cephalops pallidivittiger</i> [8], <i>Cephalops fumaceus</i> [8]
UAMIC1239-13	<i>Ceratielus fissiceps</i>	<i>Ceratielus fissiceps</i>	Species BOLD:AAQ1590	82	<i>Ceratielus sicuti</i> [7], <i>Ceratielus amoenae</i> [4], <i>Ceratielus fissiceps</i> [1]
UAMIC1683-13	<i>Ceratiella acerea</i>	<i>Ceratiella acerea</i>	Species BOLD:AAQ0564	16	<i>Ceratiella acerea</i> [11], <i>Ceratiella signata</i> [1]
UAMIC992-13	<i>Chelisia borealis</i>	<i>Chelisia borealis</i>	Species BOLD:AAQ7974	49	<i>Chelisia fraternae</i> [1], <i>Chelisia vernalis</i> [10], <i>Chelisia melanura</i> [8], <i>Chelisia thomae</i> [5], <i>Chelisia isocrenata</i> [5], <i>Chelisia renformis</i> [3], <i>Chelisia vernalis-agg</i> [2], <i>Chelisia borealis</i> [2], <i>Chelisia fraternae</i> [1], <i>Chelisia thomae</i> [1], <i>Chelisia aff. melanura</i> [1], <i>Chelisia ruficollis</i> [1]
UAMIC993-13	<i>Chelisia borealis</i>	<i>Chelisia borealis</i>	Species BOLD:AAQ7974	49	<i>Chelisia fraternae</i> [1], <i>Chelisia vernalis</i> [10], <i>Chelisia melanura</i> [8], <i>Chelisia thomae</i> [5], <i>Chelisia isocrenata</i> [5], <i>Chelisia renformis</i> [3], <i>Chelisia vernalis-agg</i> [2], <i>Chelisia borealis</i> [2], <i>Chelisia fraternae</i> [1], <i>Chelisia thomae</i> [1], <i>Chelisia aff. melanura</i> [1], <i>Chelisia ruficollis</i> [1]
UAMIC97-13	<i>Chlorochroa rossiana</i>	<i>Chlorochroa rossiana</i>	Species BOLD:AAE982	18	<i>Chlorochroa ligata</i> [1], <i>Chlorochroa rossiana</i> [2], <i>Chlorochroa granulata</i> [2]
UAMIC98-13	<i>Chlorochroa rossiana</i>	<i>Chlorochroa rossiana</i>	Species BOLD:AAE982	18	<i>Chlorochroa ligata</i> [1], <i>Chlorochroa rossiana</i> [2], <i>Chlorochroa granulata</i> [2]
UAMIC191-13	<i>Chrysobothris trisnavia</i>	<i>Chrysobothris trisnavia</i>	Species BOLD:AAQ2098	9	<i>Chrysobothris trisnavia</i> [7], <i>Chrysobothris pseudotugae</i> [1], <i>Chrysobothris carinipennis</i> [1]
UAMIC991-13	<i>Chrysobothris trisnavia</i>	<i>Chrysobothris trisnavia</i>	Species BOLD:AAQ2098	9	<i>Chrysobothris trisnavia</i> [7], <i>Chrysobothris pseudotugae</i> [1], <i>Chrysobothris carinipennis</i> [1]
UAMIC995-13	<i>Chrysops carbonarius</i>	<i>Chrysops carbonarius</i>	Species BOLD:AAH4140	42	<i>Chrysops amez</i> [2], <i>Chrysops carbonarius</i> [1]
UAMIC99-13	<i>Chrysops dawsoni</i>	<i>Chrysops dawsoni</i>	Species BOLD:AAQ8563	9	<i>Chrysops dawsoni</i> [8], <i>Chrysops caulici</i> [1]
UAMIC981-13	<i>Chrysops dawsoni</i>	<i>Chrysops dawsoni</i>	Species BOLD:AAQ8563	9	<i>Chrysops dawsoni</i> [8], <i>Chrysops caulici</i> [1]
UAMIC966-13	<i>Chrysops excitans</i>	<i>Chrysops excitans</i>	Species BOLD:AAAB870	773	<i>Chrysops excitans</i> [54], <i>Chrysops nitidus</i> [10]
UAMIC998-13	<i>Chrysops excitans</i>	<i>Chrysops excitans</i>	Species BOLD:AAAB870	773	<i>Chrysops excitans</i> [54], <i>Chrysops nitidus</i> [10]
UAMIC986-13	<i>Chrysops frigidus</i>	<i>Chrysops frigidus</i>	Species BOLD:AAQ4375	97	<i>Chrysops frigidus</i> [29], <i>Chrysops venustus</i> [5]

BIN Discordance Report

UAMIC project
611 of the 1,360 BINs – discordant (BIN shared by > 1 spp)
different taxa (identifications) with low divergence
660 concordant
89 singleton BINs



Conclusions & Future Directions

Combined with other data in BOLD
4,020 AK species have DNA barcodes
48.5% of the fauna of AK (most well-barcoded state?)
Continue to build the DNA barcode library esp. aquatics
Discordance improvements – contamination, misids, classification, taxonomy
Pursue & refine NGS methods for bulk sample ID & monitoring (USFWS)

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