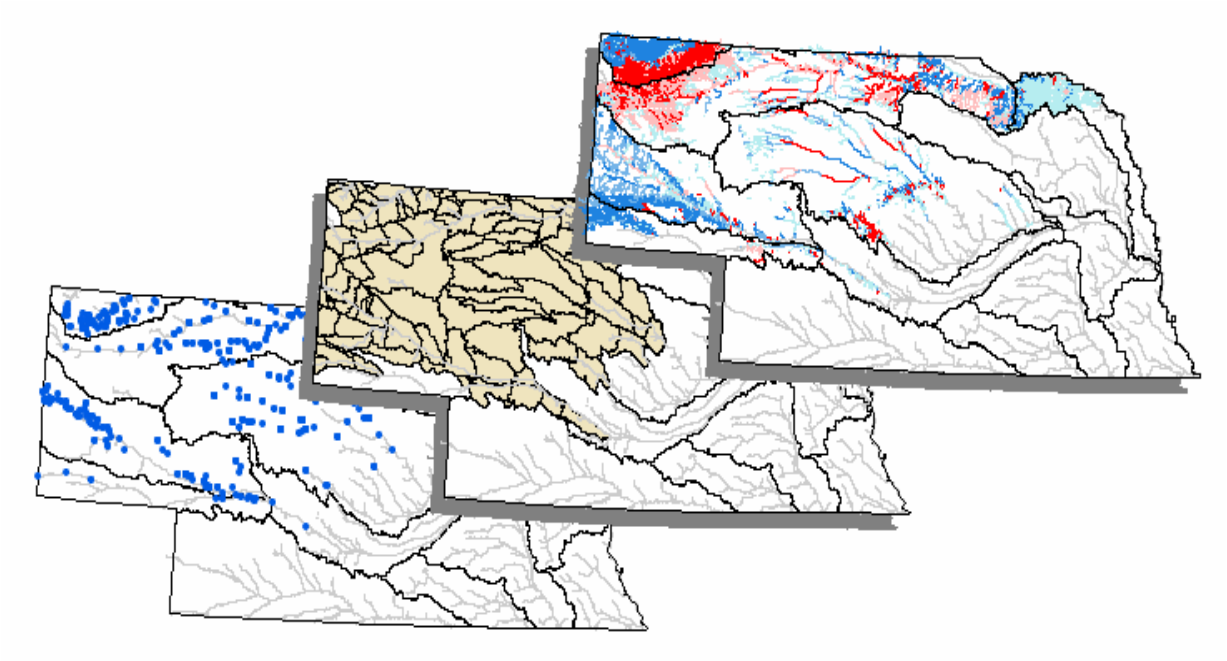
DEVELOPING PREDICTED DISTRIBUTION MODELS FOR FISH SPECIES IN NEBRASKA

Final Report: July 2006



Submitted to:

The USGS National Gap Analysis Program
Moscow, Idaho

Project Number:
00005007

DEVELOPING PREDICTED DISTRIBUTION MODELS FOR FISH SPECIES IN NEBRASKA

FINAL REPORT

11 July 2006

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Research Performed Under:
Cooperative Agreement No. 01-HQ-AG-0202
Cooperative Agreement No. 04-HQ-AG-0134

TABLE OF CONTENTS

Abstract.....ii

Acknowledgements.....iii

Introduction.....1

Methods.....1
- Community Fish Sampling Data.....1
- Mapping Geographic Ranges.....2
- GIS Base Layer for Predictive Modeling.....2
- Classification/Predictor Variables.....3
- Statistical Methods.....4
- Model Selection Criteria.....5

Model Outputs.....5
- Probability of Occurrence.....5
- Presence.....6
- Species Richness.....7

Qualifications and Limitations.....8
- Appropriate Uses.....8
- Inappropriate Uses.....9

How to Use End Products.....9
- Delivered Products.....9
- Using the Data Within a GIS.....10

Literature Cited.....11

Habitat-Affinity Reports.....13

Developing Predicted Distribution Models for Fish Species in Nebraska

ABSTRACT

Gap analysis is a conservation assessment methodology that compares the distribution of several elements of biological diversity to the distribution of lands and waters that have been set aside and are primarily managed for native species and natural ecosystem processes (Scott et al. 1993). To accomplish this task, it is necessary that GAP develop relatively high-confidence distribution maps of individual animal species for comparison with maps of land stewardship and management status. The purpose of these predicted distribution maps is to provide more precise information about the distribution of individual native and nonnative species. With this information, more accurate estimates can be made about the amount of available habitat for each species, how much has been lost, how much is currently represented within the existing matrix of public lands, and where are the best management options for conserving a particular species or community. The goal of this project was to develop statewide predicted distribution models and maps for all 100 fish species in Nebraska.

To construct the predictive fish distribution models, we first compiled 6,623 fish community collection records, which were obtained from field samples made by a variety of scientists between the years of 1857 and 2001. The collection records were then placed into a single relational database. Using ArcGIS, each collection in the database was then geographically linked, segment-by-segment to a modified version of the 1:100,000 National Hydrography Dataset (NHD) and the 1:100,000 USGS/NRCS 11-digit Hydrologic Unit (HU) coverage for Nebraska. Digital range maps, based on the 11-digit HUs, were constructed for each species, professionally reviewed, and revised as necessary.

A total of 23 local and watershed attributes were quantified and attached to each of the 62,941 stream segments within the 1:100,000 modified NHD. These 23 attributes were used as the predictor variables for modeling the distribution of each fish species. Species distributions were modeled using Classification Tree analyses, which is a nonlinear/nonparametric modeling technique. The input dataset for each species consisted of all 6,623 collection records, which contained a binary response variable indicating the species presence or absence in each sample and the associated values for each of the 23 independent predictor variables.

For each species we developed a probability of occurrence model and a simple binary presence model. The models were applied to the statewide 1:100,000 modified NHD dataset, but clipped to each species professionally-reviewed range. All of the individual model results were then merged into a “hyperdistribution” format, which allows users to simultaneously view all of the species predicted to occur in each stream segment in the state and their associated probabilities of occurrence. Model accuracy was assessed for each species. Overall accuracy averaged 92%, while omission errors averaged 3% and commission errors averaged 6%.

Habitat-affinity reports were created for each species. These reports provide descriptions of the habitat affinities of each species, which were extracted from the literature. They also provide photos of each species, the resulting predicted distribution maps, and citations for literature that references the habitat affinities. The products of the project have a wide range of uses for conservation planning and management, research, and even regulatory applications.

Acknowledgments

We would like to thank Kevin Gergely and John Mosesso, of the USGS National Gap Analysis Program, for providing funding for this project. We also need to thank all of those individuals that took time out of their busy schedules in order to professionally review the range maps of all 100 fish species. These individuals include Ken Bazata and Dave Schumacher, of the Nebraska Department of Environmental Quality, Ed Peters, a fisheries ecologist and former professor in the School of Natural Resources at the University of Nebraska–Lincoln, and Steve Schainost, of the Nebraska Game and Parks Commission. We would also like to thank John Bender, of the Nebraska Department of Environmental Quality for providing us with the coldwater streams coverage of Nebraska.

Introduction

Gap analysis is a conservation assessment methodology that compares the distribution of several elements of biological diversity to the distribution of lands and waters that have been set aside and are primarily managed for native species and natural ecosystem processes (Scott et al. 1993). To accomplish this task, it is necessary that GAP develop detailed and relatively high-confidence distribution maps of individual animal species for comparison with maps of land stewardship and management status. These comparisons are used to assess the habitat area and relative percentage of the distribution of each species with the different categories of stewardship and biodiversity management status (Csuti and Crist 1998).

There are three ways of expressing or mapping species distributions: 1) *actual distribution,* which is based on exhaustive, long–term surveys that are very rare; 2) *known distribution*, which is based on current knowledge of where the species has been found and is usually incomplete, and 3) *predicted distribution*, which combines known distributions with quantitative or qualitative models of species-habitat associations to extrapolate to unsampled areas where the species is expected to occur (Csuti and Crist 1998). It is simply impractical to map the distribution of hundreds of species through intensive field surveys across entire states, regions, or nations (Scott et al. 1996).

The purpose of these predicted distribution maps is to provide more precise information about the distribution of individual native and nonnative species within their geographic ranges. With this information, more accurate estimates can be made about the amount of available habitat for each species, how much has been lost, how much is currently represented within the existing matrix of public lands, and where are the best management options for conserving a particular species or community.

Most rivers and streams and their associated biological assemblages have been altered by local and watershed disturbances such as impoundments, channelization, urban and agricultural runoff, point-source pollution, and the introduction of exotic species. Even with the significant advancements in our understanding of species-habitatt relations over the last 50 years, we still lack the necessary understanding of how these and other human activities act individually or cumulatively to specifically alter instream habitat and local biological assemblages (Poff 1997). We also lack the necessary geospatial data for some of these human disturbances. Consequently, it is currently impossible to accurately predict the present-day distribution of the vast majority of riverine biota. Due to these and other confounding factors, the predicted fish distributions for Nebraska reflect the biological potential of a given stream segment and not necessarily the present-day assemblage of species. This means that the assemblage we predict to occur in a given segment of stream will in some instances (e.g., highly disturbed streams) be quite different from the present-day assemblage. However, in relatively undisturbed locations the predicted assemblage of fishes should reflect the present-day assemblage.

Methods

Community Fish Sampling Data

To construct the predictive fish distribution models, we first obtained 6,623 fish community collection records from Steve Schainost, of the Nebraska Game and Parks Commission, and Ken Bazata, of the Nebraska Department of Environmental Quality. These collections records contain 41,130 species occurrence records. These collection

records were obtained from field samples made by a variety of scientists between the years of 1857 and 2001. The collections cover 2,914 different stream segments within Nebraska. Consequently, many stream segments were sampled multiple times, but all records were treated a distinct (i.e., data were not pooled) for the purpose of modeling.

Once obtained, the collection records were directly transferred into a Microsoft Access relational database developed specifically for this project. This species occurrence database consists of multiple related tables that contain information about the location of each sample and information about the species collected. Each collection record in the database records the species present in each sample and not the actual or relative abundance of each species. The decision not to include measures of abundance was a result of many factors including; a) time and financial constraints, b) the fact that many collections did not include such information, c) the difficulty or inability to account for differing levels of effort and sampling methods among collections, and d) the inability to account for the degree of human disturbance at each sampling site at the time the collection was taken. However, to ensure a direct relationship back to the source data, we gave each collection a unique numeric identifier and inserted these unique codes into each respective source database, which allows abundance or other information not captured in our database to be retrieved by future investigators.

Mapping Geographic Ranges

After completing the species occurrence database, each collection in the database was then geographically linked, segment-by-segment (i.e., between tributary confluences), to a substantially modified version of the 1:100,000 National Hydrography Dataset (NHD) and the 1:100,000 USGS/NRCS 11-digit Hydrologic Unit (HU) coverage for Nebraska. The modifications made to the NHD are necessary for the purpose of accurately applying the attributes required for developing empirically-based predicted distribution models. This modified NHD for Nebraska now contains numerous local and watershed attributes that were used as predictor variables in the modeling process. For a more detailed description of the modifications and enhancements that are made to the NHD, please consult Sowa et al. (2005).

Digital range maps were then constructed for each species. These initial range maps represented all of the 11-digit HUs in which a species was collected. These range maps were then presented for professional review, via Webex, to a committee consisting of Ken Bazata, Steve Schainost and Ed Peters, a fisheries ecologist and former professor in the School of Natural Resources at the University of Nebraska – Lincoln. The committee adjusted the ranges of each species by adding HUs where they would expect to find a given species with additional sampling, and by removing any HUs that represented data errors or anomalies. The resulting final range maps were created in a separate ArcGIS database.

GIS Base Layer for Predictive Modeling

The base layer for developing the predicted distribution models was the modified NHD coverage. The finest resolution ("linear spatial grain") of our predictions was the stream segment, which in most instances is represented by a section of stream between tributary confluences (i.e., analogous to a city block). Deviations in this spatial definition arise when changes in the temperature, flow, or feature type (i.e., waterbody vs. stream) occur somewhere between confluences. Within the state boundary of Nebraska there are 62,941 individual stream segments within the 1:100,000 modified NHD that was used for developing the predictive models. This GIS coverage, however, excludes

disconnected channels, loops or braids, which represent a significant portion of the total stream miles in Nebraska. The 62,941 segments have an average length of 2.0 Km.

Classification/Predictor Variables

Riverine fishes are influenced by numerous landscape and in-channel factors and processes operating at multiple spatial and temporal scales. Of particular interest are those landscape factors operating within the overall watershed and immediate drainage of a particular stream segment and the local in-channel factors associated with that specific stream segment. Following the methods of Sowa et al. (2005), we selected seven variables as potential predictors, all of which specifically or generally pertain to these four factors (TABLE 1). In addition to their "reputation" as useful predictors (Moyle and Cech 1988), these variables were selected because they could be mapped within a GIS at a scale of 1:100,000. The specific details of how these variables are mapped and attributed to each individual stream segment can be found in Sowa et al. (2005).

A major difference between the models developed for Missouri, by Sowa et al. (2005), and the models that were developed for this project pertains to the inclusion of watershed variables as predictors. Conditions within the watershed of a given stream segment have a major influence on local habitat conditions of that segment (Hynes 1970) and consequently have a major influence on the distribution and abundance of riverine biota. For this project we were able to quantify physiographic conditions within the watershed of 62,618 stream segments in Nebraska. We were unable to quantify watershed conditions for the 323 segments that make up the Missouri River, along the eastern border of Nebraska, due to financial constraints and the immense size of the watershed of these segments. All of the watershed variables were converted into a 10 category, equal interval, variable prior to modeling. Since the range of values for each watershed variable ranges from 0 to 100%, each category represents a 10% range in values. The specific list of watershed variables is provided in Table 1, but they generally pertain to soils, surficial geology, and landform. The source data for these variables are provided in the metadata that accompanies this report.

Table 1. Descriptions for the 23 local and watershed predictor variables.

Local variable	**Description**
Flow	Binary variable that differentiates perennial and intermittent flow
Temp	Binary variable that differentiates cold and warm water streams
Linkr10	A ten category description of stream size based on Shreve Link magnitude (Shreve 1966)
sdiscr_2c	Binary variable that differentiates stream segments that flow into either the same size stream or a larger stream
grdseg10	A ten category designation of stream segment gradient (m/km)
neb_geol	A 14 category variable designating the surficial geology through which each stream segment flows
stxt4cat	A 4 category variable designating the general soil texture class through which each stream segment flows
drn_grp	A 5 category variable designating the major drainage group in which a given stream segment occurs
Watershed Variable	
avegrd10	Average gradient of all stream segments in the watershed
hyda_p	Percent of watershed containing Hydrologic Soil Group A placed into ten categories
hydb_p	Percent of watershed containing Hydrologic Soil Group B placed into ten categories
hydc_p	Percent of watershed containing Hydrologic Soil Group C placed into ten categories
hydd_p	Percent of watershed containing Hydrologic Soil Group D placed into ten categories
hydbc_p	Percent of watershed containing Hydrologic Soil Group B/C placed into ten categories
stxt01_p	Percent of watershed containing Soil Surface Texture Class 1 (Sand) placed into ten categories.
stxt02_p	Percent of watershed containing Soil Surface Texture Class 2 (Loamy sand) placed into ten categories.
stxt03_p	Percent of watershed containing Soil Surface Texture Class 3 (Sandy loam) placed into ten categories.
stxt04_p	Percent of watershed containing Soil Surface Texture Class 4 (Silt loam) placed into ten categories.
stxt06_p	Percent of watershed containing Soil Surface Texture Class 6 (Loam) placed into ten categories.
stxt08_p	Percent of watershed containing Soil Surface Texture Class 8 (Silty clay loam) placed into ten categories.
stxt09_p	Percent of watershed containing Soil Surface Texture Class 9 (Clay loam) placed into ten categories.
stxt11_p	Percent of watershed containing Soil Surface Texture Class 11 (Silty clay) placed into ten categories.
stxt12_p	Percent of watershed containing Soil Surface Texture Class 12 (Clay) placed into ten categories.

Statistical Methods

Species distributions were modeled using the Classification Tree add-on of SPSS version 14.0. Classification tree analyses are nonlinear/nonparametric modeling techniques that typically employ a recursive-partitioning algorithm which repeatedly partitions the input data set into a nested series of mutually exclusive groups, each of which is as homogeneous as possible with respect to the response variable (Olden and Jackson 2002). The resulting tree-shape output represents sets of decisions or rules for the classification of a particular dataset. These rules can then be applied to a new unclassified dataset to predict which records or, in our case, location will have a given outcome.

Nonlinear models are gaining favor in wildlife-habitat relation modeling because the resulting nonparametric models define constraint envelopes of suitable habitat rather than correlations and thus more formally agree with niche theory (O'Connor 2002). That is, nonlinear models more accurately capture the normal distribution curve that species abundance will typically follow along an environmental gradient (ter Braak and Prentice 1988). Also, nonlinear models do not fall under the standard assumptions of linear, additive or multiplicative relationships, normally distributed errors, and uncorrelated independent variables, which are often unrealistic assumptions that are violated with correlative approaches (Olden and Jackson 2002; Huston 2002; O'Conno2002). Classification trees, in particular, have become a popular modeling technique because they construct models with accuracy comparable to the more "sophisticated" nonlinear methods (e.g., Neural Networks; Olden and Jackson 2002), and yet are mucheasier to construct and interpret (Breiman et al. 1984; De'ath and Fabricus 2000).

The specific modeling algorithm we used was Exhaustive CHAID, which is a modification of CHAID developed by Biggs et al. (1991). It was developed to address some weaknesses of the CHAID method. In some instances CHAID may not find the optimal split for a variable since it stops merging categories as soon as it finds that all remaining categories are statistically different (AnswerTree® User's Guide 2001). Exhaustive CHAID remedies this problem by continuing to merge categories of the predictor variable until only two "supercategories" are left and then examines the series of merges for the predictor and finds the set of categories that gives the strongest association with the target variable and computes an adjusted-*p* value for that association. Consequently, exhaustive CHAID can find the best split for each individual predictor and then choose which of these predictors to split on at each level in the tree by comparing the adjusted-*p* values.

The above statistical methods were used to generate predictive distribution models for most of the fish species. However, for some species there were too few occurrence records (i.e., less than 10) and no model could be developed. Also, for species that are only found in the Missouri River, the models were developed subjectively, based on collection records and the recommendations of Ken Bazata, Ed Peters, and Steve Schainost. For those species that could be modeled we generated species-specific input datasets consisting of all 6,623 collection records. In these datasets the response variable is a binary variable, where a 1 indicates that the species was present and a 0 indicates the species was not captured. The dataset also contained the associated categorical values for each record for each of the 23 independent predictors provided in Table 1.

Model Selection Criteria
Exhaustive CHAID allows the user to specify apriori stopping criteria related to the size of the tree (i.e., number of levels) and the minimum number of collection records that can occur in any given child node. These stopping criteria help reduce the probability of gross overfitting of the model which can be a problem with extremely large datasets containing a large number of predictor and/or response variables (Answer Tree® User's Guide 2001). We set the maximum number of levels allowable in the final tree equal to 10, which was higher than the number of levels ever achieved. We set the minimum number of collections allowable in a parent node equal to 10% and the number allowable in a child node equal to 1% of the total occurrence records for each species. However, these values were capped at 10 and 5 collections for the parent and child nodes, respectively in those instances where there were fewer than 100 occurrence records for a species. We set the alpha level for splitting and merging equal to 0.05 and used the Bonferoni alpha adjustment to account for the increased likelihood of a Type One error associated with multiple comparisons.

Model Outputs
Probability of Occurrence
Each terminal node, in the classification tree models, represents a combination of watershed and local conditions and provides a corresponding probability of occurrence for a given species under that set of conditions. These probabilities can be applied to an independent dataset using a series of if/then model statements that are generated by SPSS. Once a model was completed, for a given species, we applied the resulting if/then statement model to the attribute table of the statewide 1:100,000 modified NHD. This process produced a column for that particular species which provides the probability of occurrence for each of the 62,618 stream segments in the state. However, since potential distributions are often constrained by isolation mechanisms and by biotic interactions, particularly predation (Jackson et al. 2001) and competition (Winston 1995), species rarely, if ever, occupy all suitable locations (Hutchinson 1957). Therefore, for all stream segments falling outside of the professionally-reviewed geographic range, we converted the probabilities generated by the model to zero. Results of this process can be seen in the "Probability of Occurrence" maps provided for each species in the habitat-affinity reports.

Individual models were then merged into two similar, but distinct DBASE (hyperdistribution) files that can be spatially related to the modified 1:100,000 NHD, in ArcView or ArcGIS via the segment id code (named: seg_id). One of these DBASE files is in a "flat file" format (named: NE_hyperdistribution_probability_flat) that contains a single row for each stream segment in Nebraska and a column for each species, which is denoted by a species code (e.g., F###). The column for each species provides the probability of occurrence for that species for each stream segment. This database is suited to addressing research or management questions pertaining to a single species. The other DBASE file (named: NE_hyperdistribution_probability_list) provides this same information in a relational database, or list, format. In this database the segment id code repeats as many times as there are species predicted to have a greater than zero probability of occurring in that segment. There are also columns that provide the species common name and the probability of occurrence. This database is best suited to addressing research or management questions pertaining to multiple species since it displays a list of species and associated occurrence probabilities for each stream segment.

NOTE: For species that could not be modeled using Classification Tree procedures we could not generate a specific probability of occurrence for each stream segment. However, using the general occurrence model, described above, these species are predicted to occur in stream segments within Nebraska. These species were included in the probability of occurrence databases by using 999.00 to denote that these species are predicted to occur within a given segment, although with unknown probability.

Presence

While the probability of occurrence databases provide a wealth of distributional information for each species, they are not particularly suited to multi-species conservation assessments like a gap analysis, which often rely on richness or diversity measures. Calculating richness or diversity measures require explicit yes or no statements about species presence, which are not provided with a continuous probability of occurrence. In many instances, modelers deem a species as being present at locations where it has a greater than 50% probability of occurrence. However, because sampling methods are often inefficient or insufficient, species that have low detection probabilities rarely have probability of occurrences that exceed 50% and would therefore never be predicted as "present" across their entire range, even within optimal habitat. In fact, most of the fish species modeled in this project have maximum occurrence probabilities that are below 50%.

To overcome this problem we decided to use the "relative-50%" rule developed by Sowa et al. (2005) in order to generate a pure presence model for each species. Specifically, for each model we first identified the terminal node having the highest occurrence percentage that also contained at least 50 collection records. Selecting the highest occurrence percentage only from those terminal nodes with 50 or more collection records was done to account for the fact that terminal nodes with only a handful of samples generally provided somewhat inflated or deflated occurrence percentages. We then divided the highest occurrence percentage by 2 and selected all nodes having occurrence percentages greater than or equal to this percentage. For example, if the highest occurrence percentage was 80% we would select all nodes with occurrence percentages greater than or equal to 40% and if the highest occurrence percentage is 20% we would select all nodes with occurrence percentages greater than or equal to 10%. Within the statewide probability of occurrence database, described above, we queried the appropriate probability of occurrence column to select all stream segments having a probability of occurrence greater than or equal to the specific relative 50% occurrence identified for a given species. Then, we created a new column for that species and attributed all of the selected segments with a value of 1 to denote presence, while all other segments were attributed with a 0. Results of this process can be seen in the "Relative 50% Occurrence" maps provided for each species in the habitat-affinity reports.

Once we completed all of the species using this method the newly created columns containing the binary presence/absence attributes were extracted and placed into a separate presence database in order to keep the binary data fields separate from the continuous probabilities. As with the probability of occurrence database, we created two separate DBASE (hyperdistribution) files; one in a "flat file" format (named: NE_hyperdistribution_presence_flat) and one in a relational "list" format (named: NE_hyperdistribution_presence_list). These files can be also spatially related to the modified 1:100,000 NHD, in ArcView or ArcGIS via the segment id code.

This “relative-50%” approach to defining presence proved to be an efficient and standardized approach for pruning the resulting classifications trees that accounts for differences in species prevalence, commonness, and detection, which were not accounted for by the other pruning tools included in SPSS Classification Tree. Essentially, with this method we are identifying the sets of conditions in which each species has a relatively high probability of occurrence. For a variety reasons, we hesitate to state that these models produce maps of “core habitat” for each species. However, in the most general sense and for the sake of simplifying communication, this may be one way of interpreting these models.

Lacking an independent dataset, we assessed the accuracy of the presence models against the input data used to create the models. For each species, we calculated omission (species occurs, but not predicted), commission (species predicted, but does not occur), and overall error rates. These error rates are provided in the habitat-affinity reports for each species. The relative-50% rule led to the pattern of omission and commission errors that is often found in wildlife habitat modeling (Karl et al. 2002). Lowest commission and highest omission errors typically occurred for species that could be generally categorized as having broad geographic ranges, being common throughout the range, typically abundant wherever suitable habitat exists, and having relatively good dispersal capabilities (e.g., many Centrarchid species). Essentially these are common species with high detectability and that are likely to stray into, and thus be collected in, marginal or unsuitable habitats. Highest commission and lowest omission errors, on the other hand, typically occurred for species categorized as having either narrow or broad geographic ranges, being patchily distributed throughout the range, rarely or never abundant even within areas of suitable habitat, and relatively poor dispersal capabilities (e.g., many darter and minnow species). These are rare or patchily-distributed species with low detectability that are seldom collected outside of areas of suitable habitat. Table 2 provides the overall average accuracy statistics of the models.

Table 2. Percent accuracy statistics for the “Relative 50%” models.

	Average	**Min**	**Max**
Omission	3	0	19
Commission	6	0	33
Overall	92	62	100

Species Richness

We used the binary, relative 50%, occurrence models to calculate predicted overall species richness and richness of globally rare, threatened, and endangered species. This statistics were placed into a separate database (Named: NE_count_sp_richness_g123). Like the other databases, this database can also be spatially related to the modified 1:100,000 NHD, in ArcView or ArcGIS via the segment id code. With this database users can select an individual stream segment to view a variety of richness statistics for that segment or generate graduated color/symbol maps to display these richness statistics across the entire state or any subunit of Nebraska.

Qualifications and Limitations

The species distribution maps were produced at 1:100,000, following the methods used by Sowa et al. (2005), and are intended for applications at relatively broad spatial scales (homogeneous areas generally covering 1,000 to 1,000,000 ha and stream segments ranging from 10 to 1000 km, which are made up of multiple local biotic communities). Applications of these data to local site-level analyses (e.g., individual stream habitats) are likely to be compromised by finer-grained patterns of environmental heterogeneity not captured within our models. The models should be viewed as testable hypotheses as their suitability will vary with each given application.

Because of these and other qualifications and limitations it is imperative that individuals, interested in using these distribution maps for personal or professional means, read the detailed methods and assumptions provided in Sowa et al. (2005). The USGS Biological Resources Division or the University of Missouri shall not be held liable for improper or incorrect use of these data.

All information is created with a specific end use or uses in mind. This is especially true for GIS data, which is expensive to produce and must be directed to meet the immediate program needs. Therefore, we list below both appropriate and inappropriate uses. This list is in no way exhaustive, but should serve as a guide to assess whether a proposed use can or cannot be supported by these predicted distribution models. For most uses, it is unlikely that GAP will provide the only data needed, and for uses with a regulatory outcome, field surveys should verify the result. In the end, it will be the responsibility of each data user to determine if these data can answer the question being asked, and if they are the best tool to answer that question.

When determining whether to apply GAP data to a particular use, there are two primary questions: do you want to use the data as a map for the particular geographic area, or do you wish to use the data to provide context for a particular area?

Appropriate Uses:

1. Statewide biodiversity planning
2. Regional (Councils of Government) planning
3. Regional habitat conservation planning
4. County comprehensive planning
5. Large-area resource management planning
6. Coarse-filter evaluation of potential impacts or benefits of major projects or plan initiatives on biodiversity, such as utility or transportation corridors, wilderness proposals, regional open space and recreation proposals, etc.
7. Determining relative amounts of management responsibility for specific biological resources among land stewards to facilitate cooperative management and planning.
8. Basic research on regional distributions of species and to help target both specific species and geographic areas for needed research.
9. Environmental impact assessment for large projects or military activities.
10. Estimation of potential economic impacts from loss of biological resource-based activities.
11. Education at all levels and for both students and citizens.

Inappropriate Uses:

1. It is far easier to identify appropriate uses than inappropriate ones, however, there is a "fuzzy line" that is eventually crossed when the differences in resolution of the data, size of geographic area being analyzed, and precision of the answer required for the question are no longer compatible. Examples include:
2. Combining GAP data with other data finer than 1:100,000 scale to produce new hybrid maps or answer queries.
3. Generating specific areal measurements from the data finer than the nearest thousand hectares (minimum mapping unit size and accuracy affect this precision).
4. Establishing exact boundaries for regulation or acquisition.
5. Precisely quantifying the abundance, health, or condition of any feature.
6. Establishing a measure of accuracy of any other data by comparison with GAP data.
7. Altering the data in any way and redistributing them as a GAP data product.
8. Using the data without acquiring and reviewing the metadata and this report.

How to Use the End Products

Delivered Products

A total of ten individual products were produced for this project.

- **Habitat-affinity reports** (in PDF format) for each species, which are provided below
- **Probability of occurrence models** for those species that could be modeled with classification trees analyses and the general models for all other species. These are provided in Supplement A.
- **A GIS coverage of Nebraska streams** (Named: NE_streams), which contains a unique code (Named: Seg_ID) for each of the 62,941 stream segments in NE.
- **A dbf file** (Named: NE_modeling_atts) which contains all of the local and watershed predictor variables for eachstream segment in NE, which can be related to the NE_streams file via Seg_ID.
- **Five dbf files** that contain the modeled species distribution data for each of the 62,941 stream segments, which can be related to the NE_streams coverage via Seg_ID. See the section above entitled, Modeled Outputs, for descriptions of each of these files.
    - NE_hyperdistribution_presence_flat,
    - NE_hyperdistribution_presence_list,
    - NE_hyperdistribution_probability_flat,
    - NE_hyperdistribution_probability_list,
    - NE_count_sp_richness_g123
- **A dbf file** (Named: NE_fish_species_list) containing information about each of the 100 fish species in Nebraska, including common name, scientific name, species code, ITIS code, and global and state conservation status. This file can be related to the hyperdistribution dbf files (that are in a LIST format), just described, via a common field named “Species_ID”.

Using the Data Within a GIS
After creating a new project in either ArcView or ArcGIS, add the NE_streams coverage to the view. Next add the 5 dbf files containing the modeled distribution information. Then add the NE_fish_species_list dbf file and link this file to the NE_hyperdistribution_**presence**_list and the NE_hyperdistribution_**probability**_list files via species_id.

To view the predicted presence of a given species, based on the relative-50% rule, join the NE_hyperdistribution_**presence_flat** file to the NE_streams coverage via Seg_ID and query the appropriate species code in the NE_hyperdistribution_**presence_flat** file using the syntax; F### =1. Consult the NE_fish_species_list to find the appropriate species code. You can also display and analyze areas of overlapping distribution for two or more species by querying the NE_hyperdistribution_**presence_flat** file using the syntax; F### = 1 and F### = 1 and etc..

To view all of the species predicted to occur in a specific segment, based on the relative 50% rule, link the NE_hyperdistribution_**presence_list** file to the NE_streams coverage via Seg_ID and then simply select that segment in the NE_streams coverage then promote the selected records in the NE_hyperdistribution_**presence_list** file

To generate a graduated-color or symbol map showing the occurrence probability for a given species, join the NE_hyperdistribution_**probability_flat** file to the NE_streams coverage via Seg_ID. Then change the legend for the NE_streams coverage to a graduated color or symbol using the appropriate species id (i.e., F###). Again, Consult the NE_fish_species_list to find the appropriate species code.

To view the occurrence probabilities for all of the species predicted to occur in a specific segment, link the NE_hyperdistribution_**probability_list** file to the NE_streams coverage via Seg_ID and then simply select that segment in the NE_streams coverage then promote the selected records in the NE_hyperdistribution_**presence_list** file

To generate a graduated-color or symbol map showing overall species richness or globally rare, threatened or endangered richness, join the NE_count_sp_richness_g123 file to the NE_streams coverage via Seg_ID. Then change the legend for the NE_streams coverage to a graduated color or symbol using the appropriate field (e.g., spt_rich = total fish species richness and g123 = richness of globally rare, threatened, and endangered species).

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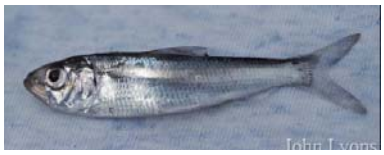
HABITAT-AFFINITY REPORTS

FOR THE FISHES OF NEBRASKA

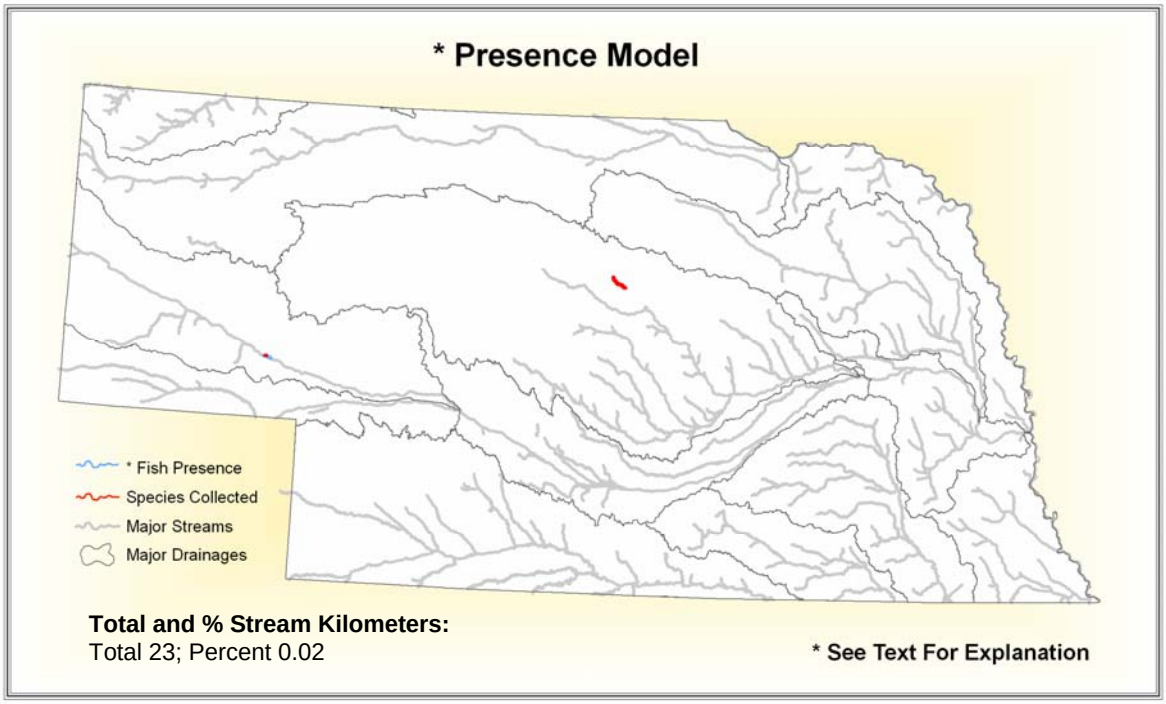
Alewife

Alosa Pseudoharengus



Native: No
State Rank: SNA
Global Rank: G5

ITIS Code: 161706
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The alewife was first introduced from New Jersey into the Merritt Reservoir in 1965. The species adapted well to the new area and spread into new areas east of the Merritt and into parts of north central Nebraska (Morris, Morris, and Witt 1974).

Habitat Affinities:

In Nebraska alewives can be found in all depths and reaches of lakes, however they do avoid very cold waters. They are a schooling fish that consume zooplankton, which is why they have been introduced in some areas. During spawning season they move into shallow waters. They prefer to spawn in are gravel areas during the evening hours (Tomelleri and Eberle 1988).

Predictive Models:

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 0%
Overall: 100%

References:

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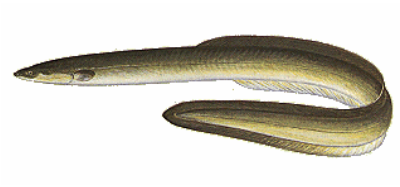
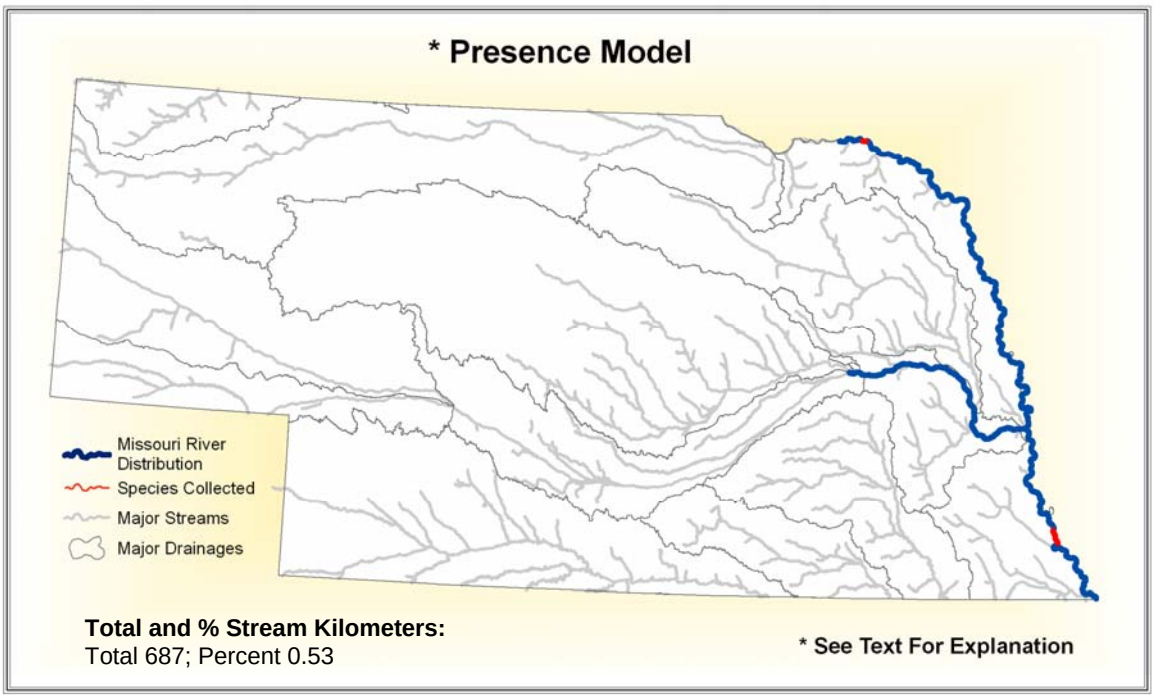


American Eel

Anguilla rostrata

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161127
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The American eel is mainly found in the Missouri River south of Gavin's Point Dam and the main stem of the lower portion of the Platte River. However, it has been known to cross land and could move to almost any stream in the state. Female American eels predominate in Nebraska with only the larger females able to migrate far upstream (Morris, Morris, and Witt 1974).

Habitat Affinities:

The American eel is a catadromous species migrating upstream where it settles in pools or backwaters until it reaches sexual maturity (4-7 years). It is able to withstand significant turbidity (Trautman 1957) and is known to venture on land to find prey and circumvent small dams or waterfalls (Eddy and Underhill 1974). Although inland migration north of Louisiana has been limited by the construction of large dams (Clay 1975; Cross and Collins 1975; Etnier and Starnes, 1993; Robinson and Buchanan 1988). Pflieger (1997) notes that distribution and abundance are hard to predict because normal sampling equipment used does not work well for this species. As a nocturnal feeder, the American eel spends daytime hours in deep pools near logs, boulders, or other cover (Pflieger 1997).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 4%
Overall: 96%

References:

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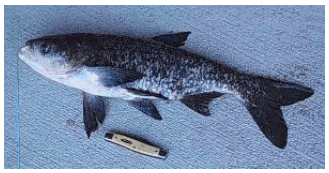
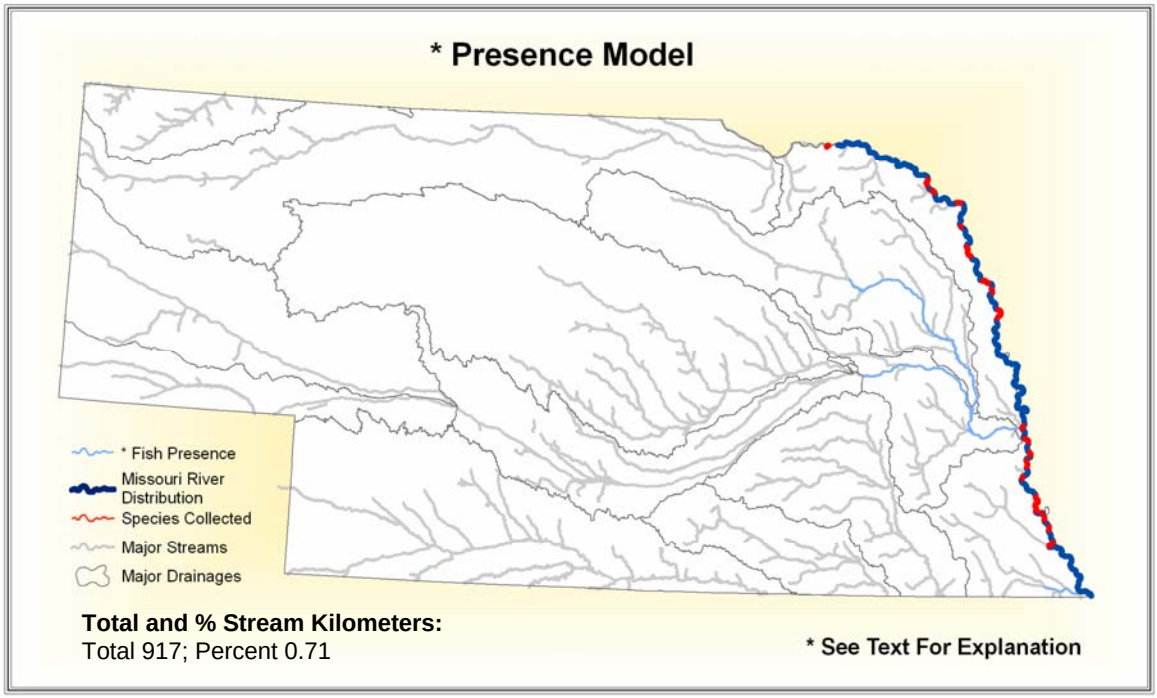


Bighead Carp

Hypophthalmichthys nobilis

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 163692
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Bighead carp are mainly found in the eastern portions of Nebraska near the Missouri River. They can be found in the Missouri River south of Gavin's Point Dam, as well as the lower main stems of the Nemaha, Platte, and Elkhorn Rivers.

Habitat Affinities:
The bighead carp is native to the big rivers of eastern China (Yangtze and Huang Ho) so it has adapted well to the Missouri River. Using gill rakers to filter plankton and detritus (Pflieger 1997) the bighead carp is able to adapt to various environments. Both young and adults prefer the lower reaches of tributary streams and overflow waters in the river floodplain. Large concentrations of bighead carp have been observed in the tailwaters of several impoundments (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 5%
Overall: 95%

References:

Clay, W. M. 1975. The fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 416 pp.

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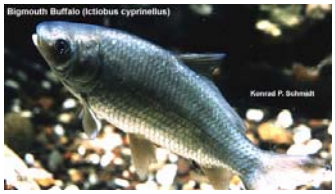
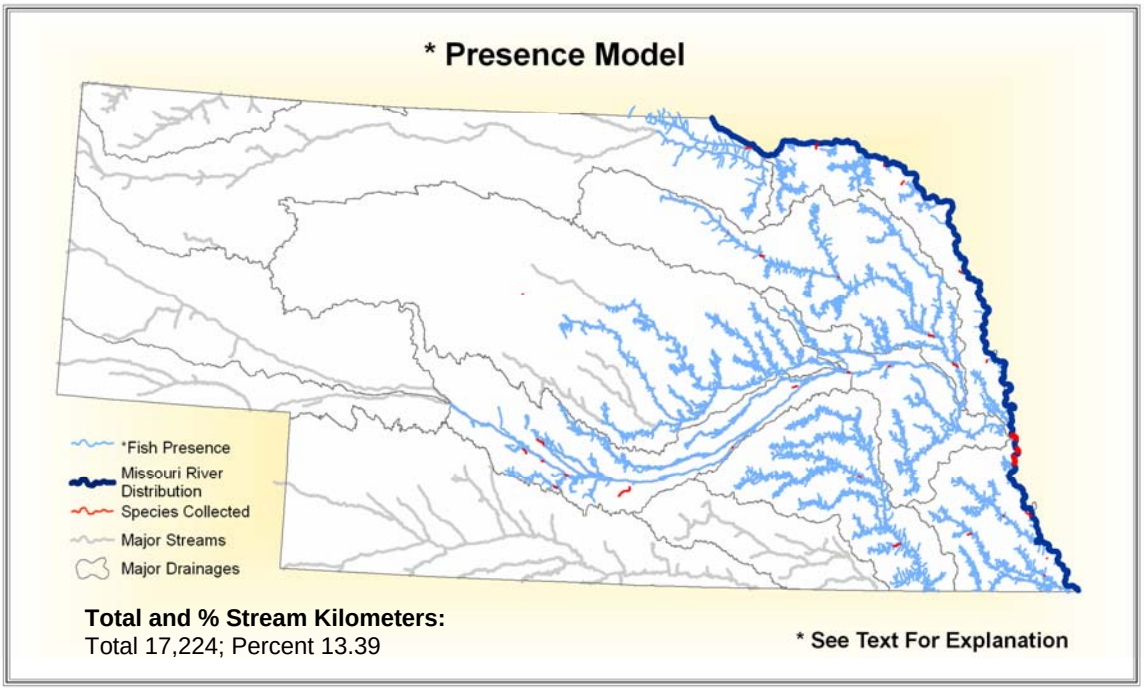
Bigmouth Buffalo

Ictiobus cyprinellus



Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163956
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The bigmouth buffalo can be found throughout the eastern portion of Nebraska in the river systems of the Missouri, Platte, Loup, and Elkhorn, Big Blue and Nemaha.

Habitat Affinities:
The bigmouth buffalo lives primarily in quiet waters in pools of large streams, lakes, and reservoirs (Pflieger 1971; Robinson and Buchanan 1988; Trautman 1957). While it is commonly encountered in deep pool regions (Trautman 1957; Robinson and Buchanan 1988), the species can also be found in quiet shallow waters (Etnier and Starnes, 1993; Trautman 1957) and tolerates high water temperatures (Robinson and Buchanan 1988). It is more tolerant of high turbidity and standing water than other species (Pflieger 1997; Etnier and Starnes, 1993; Trautman 1957) and is successful in impoundments (Pflieger 1971; Robinson and Buchanan 1988). It sometimes moves into small streams to spawn, and its young remain in these streams during the first year of life (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 33%
Overall: 66%

References:

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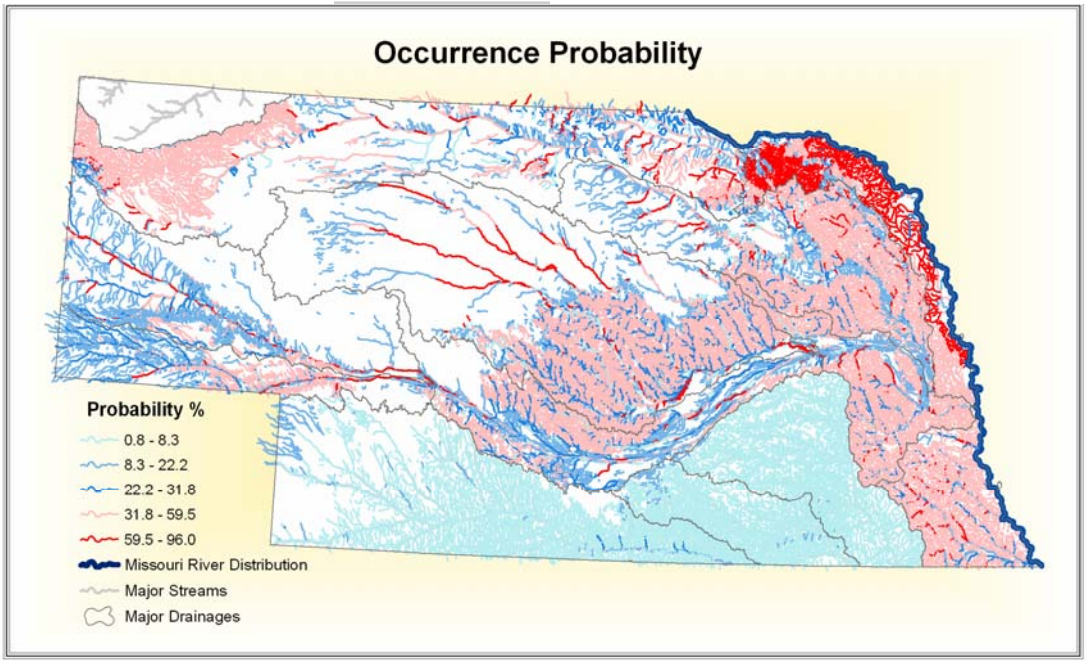
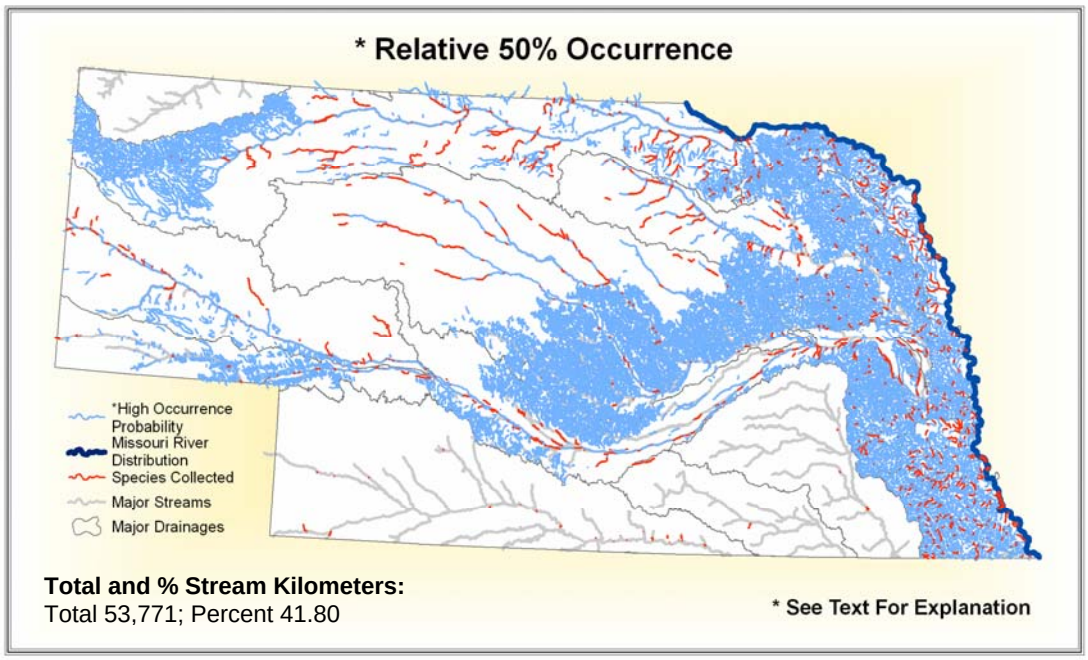
Bigmouth Shiner

Notropis dorsalis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163439
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The bigmouth shiner can generally be found across the entire state of Nebraska however they are more common in the eastern portion of the state along the Missouri and Platte Rivers. The Bigmouth Shiner is less common than the other shiner species (Morris, Morris and Witt 1974).

Habitat Affinities:
Bigmouth shiners are common in small, low to moderate-gradient prairie streams with slight current and unstable sandy bottoms (Pflieger 1997; Cross and Collins 1975; Trautman 1957; Etnier and Starnes, 1993). They are most abundant in streams having permanent flow (Pflieger 1971). They are able to adapt to fluctuating water levels, turbidity, and pollutants, but require a sand substrate not covered with silts (Trautman 1957; Etnier and Starnes, 1993). According to Etnier and Starnes (1993) bigmouth shiners occupy cool creeks but in Ohio (Trautman 1957) they were found to be uncommon or absent in cool streams. Pflieger (1997) states that the species has become more abundant in the past 50 years, due in part to the channelization of prairie streams.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 11%
Commission: 18%
Overall: 71%

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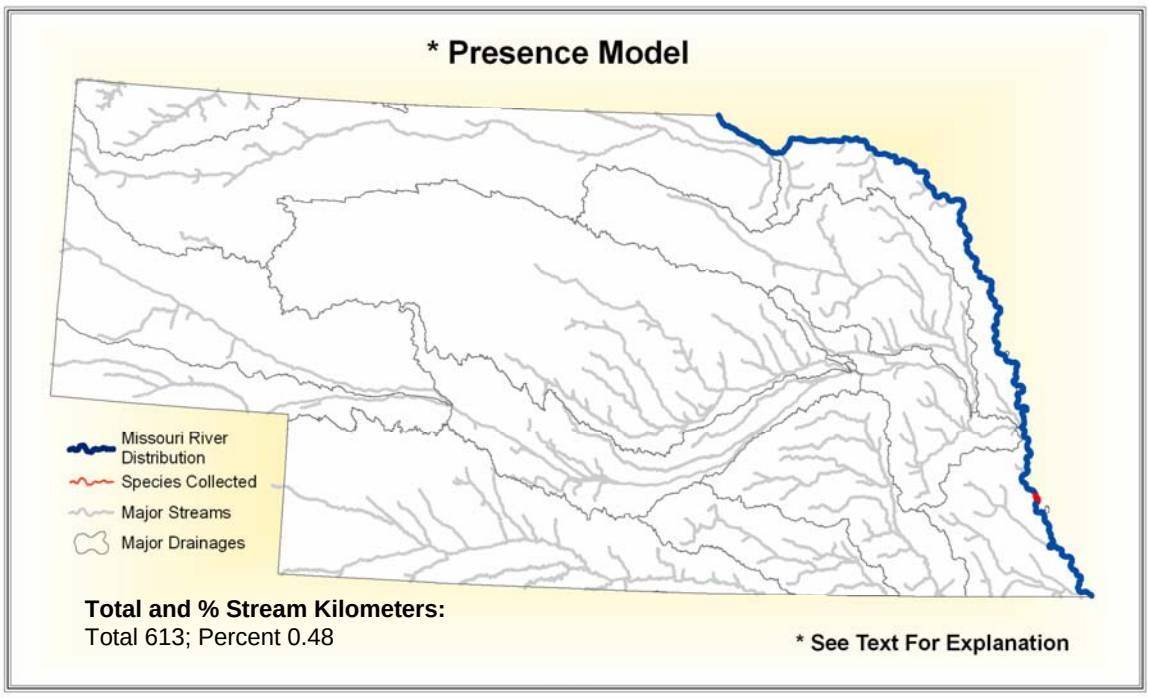
Black Buffalo

Ictiobus niger

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163957
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The black buffalo's range in the state of Nebraska is confined to the Missouri River.

Habitat Affinities:
The black buffalo occurs in a variable range of habitats with only occasional abundance. However, investigators in Arkansas and Kansas find that the black buffalo occurs in impoundments and reservoirs (Cross and Collins 1975; Robinson and Buchanan 1988). In Ohio Trautman (1975) found occasional abundance in turbid, mud-bottomed, shallow overflow ponds and sloughs. Whether in large rivers, shallow riffles or impoundments, the existence of strong current is a common denominator of the black buffalo habitat (Cross 1967; Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), as evidenced by the nickname "current buffalo" given by commercial fisherman.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

References:

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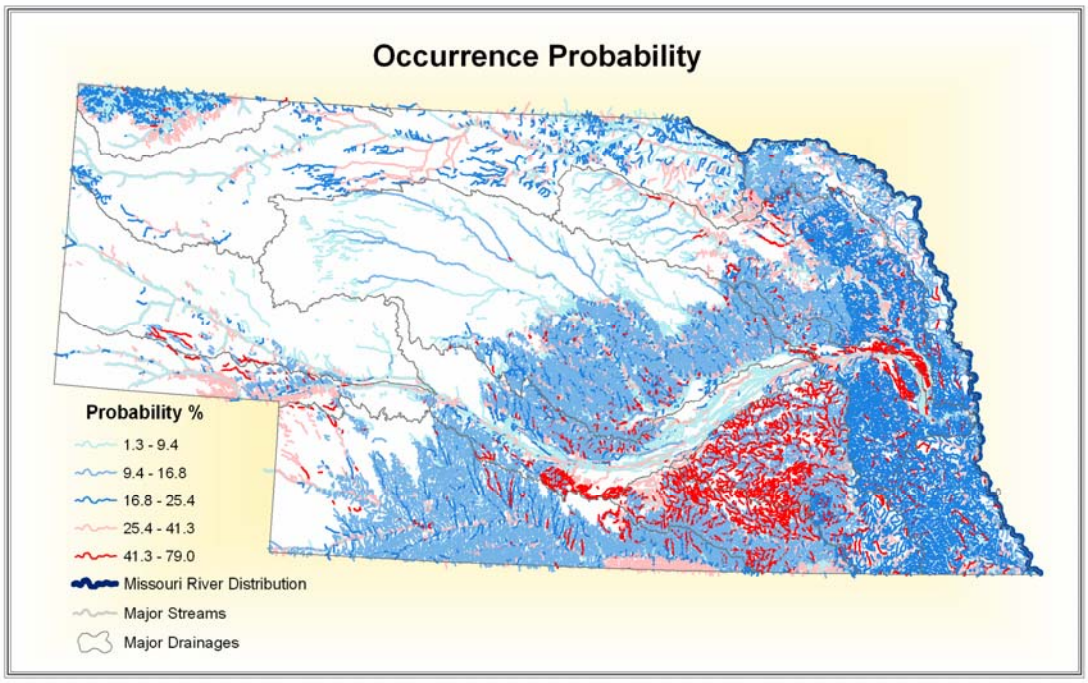
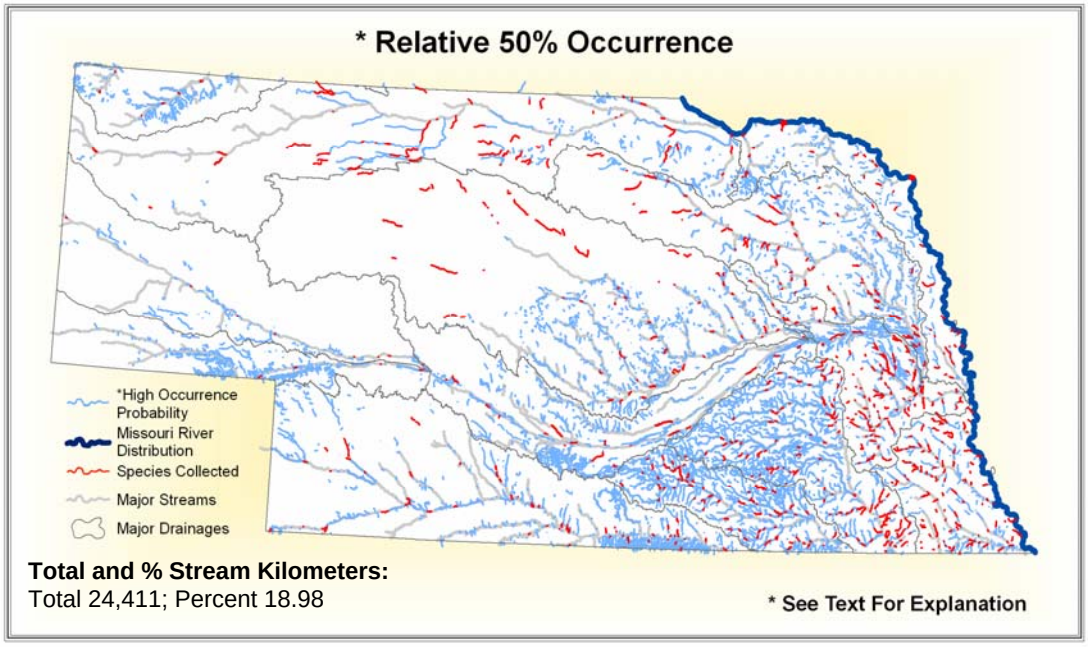
Black Bullhead

Ameiurus melas

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164039
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 24,411; Percent 18.98

State Range:

Black bullhead can be found across the entire state of Nebraska.

Habitat Affinities:
The black bullhead inhabits a wide range of aquatic habitats including; pools, backwaters, oxbows, sloughs, bayous, swamps, marshes, ponds, lakes, and reservoirs. It is able to access many ponds by invading formerly dry drainage ditches and spillways after heavy rains cause overflow conditions (Robinson and Buchanan 1988). The black bullhead is also highly tolerant to many types of industrial pollution (Trautman 1957) and warm water with low oxygen levels (Phillips et. al. 1982). In general it prefers warm, quiet, turbid water with silt bottom, an absence of current and a low diversity of fish fauna. Especially favorable habitats of the black bullhead are pools of small intermittent creeks and the muddy oxbows and backwaters of large streams of the Plains Aquatic Subregion. In the Mississippi Alluvial Plains Aquatic Subregion it is found only in a few silty sloughs and small intermittent creeks (Pflieger 1997). In Ohio Trautman (1957) found the largest populations in low-gradient segments of small to moderate sized streams with silty water and soft mud bottoms, and notes that the black bullhead is incapable of invading deeper, cooler, clearer waters.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 15%
Commission: 16%
Overall: 69%

References:

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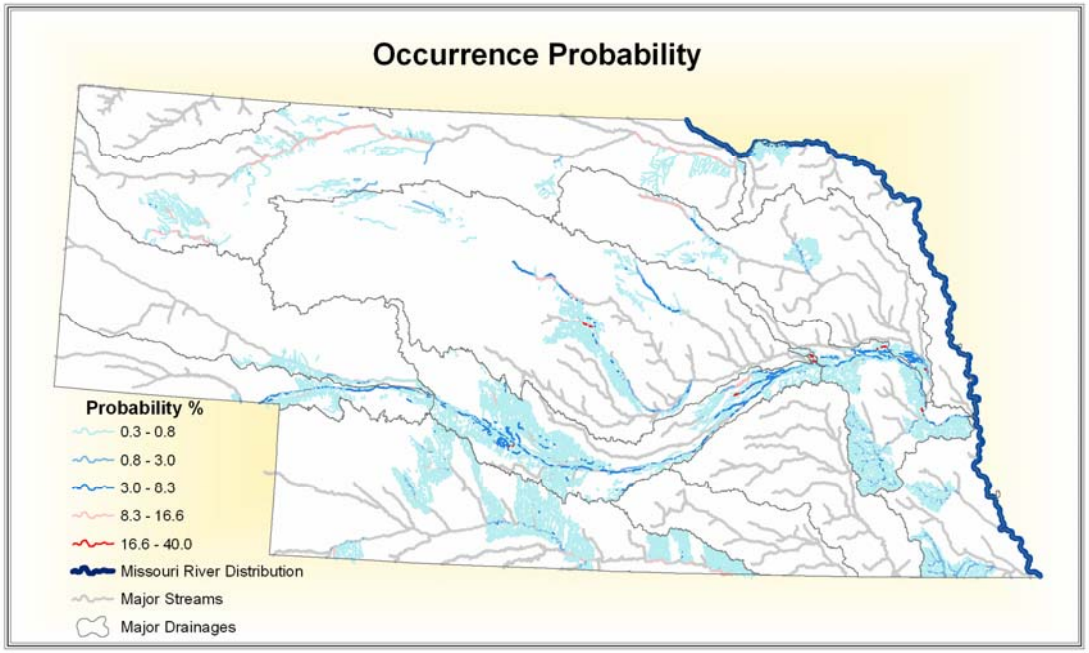
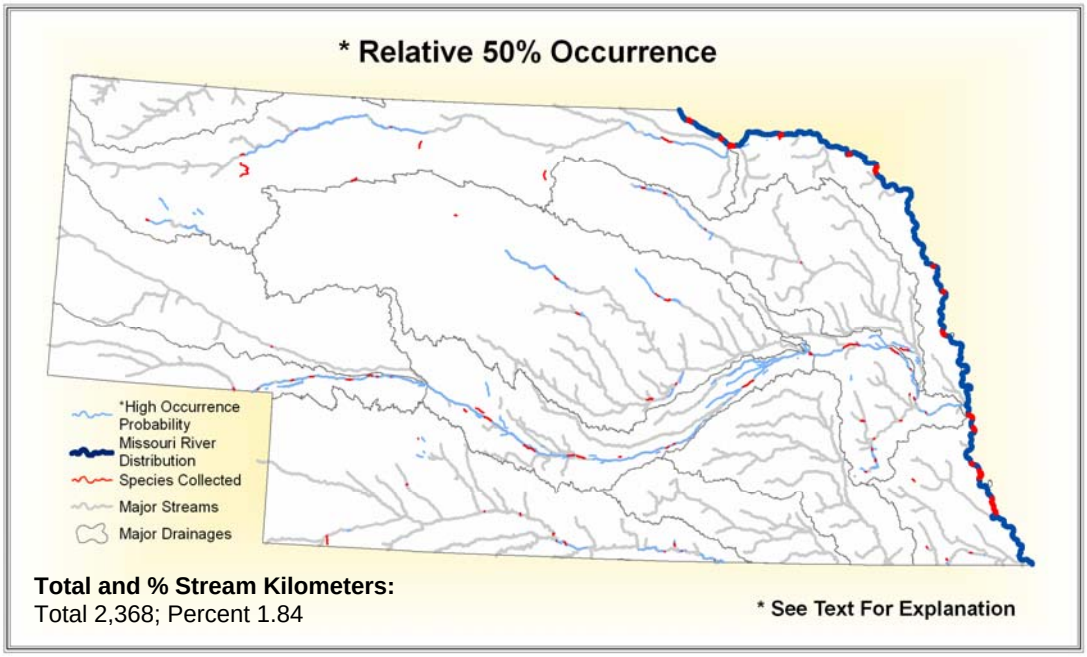
Black Crappie

Pomoxis nigromaculatus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168167
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Black crappie can be found patchily distributed throughout the state of Nebraska primarily associated in and around large lakes and reservoirs.

Habitat Affinities:
The principal requirements of the black crappie are clear water, abundant cover in the form of submerged timber or aquatic vegetation (Pflieger 1971; Robinson and Buchanan 1988) and sandy or mucky bottoms (Trautman 1957). The black crappie has adapted well to impoundments and reservoirs, particularly clear stream-fed arms of reservoirs (Robinson and Buchanan 1988), with extensive growths of aquatic vegetation and little turbidity or siltation (Douglas 1974; Clay 1975; Etnier and Starnes 1993; Trautman 1957). Small populations are also present in low gradient portions of large streams (Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 7%
Overall: 92%

References:

Aadland, L. P, C. M. Cook, M. T. Negus, H. G. Drewes and C. S. Anderson. 1991.microhabitat preferences of selected stream fishes and community-oriented approach to instream flow assessments. Minnesota Department of Natural Resources, Section of Fisheries. 142 pp.

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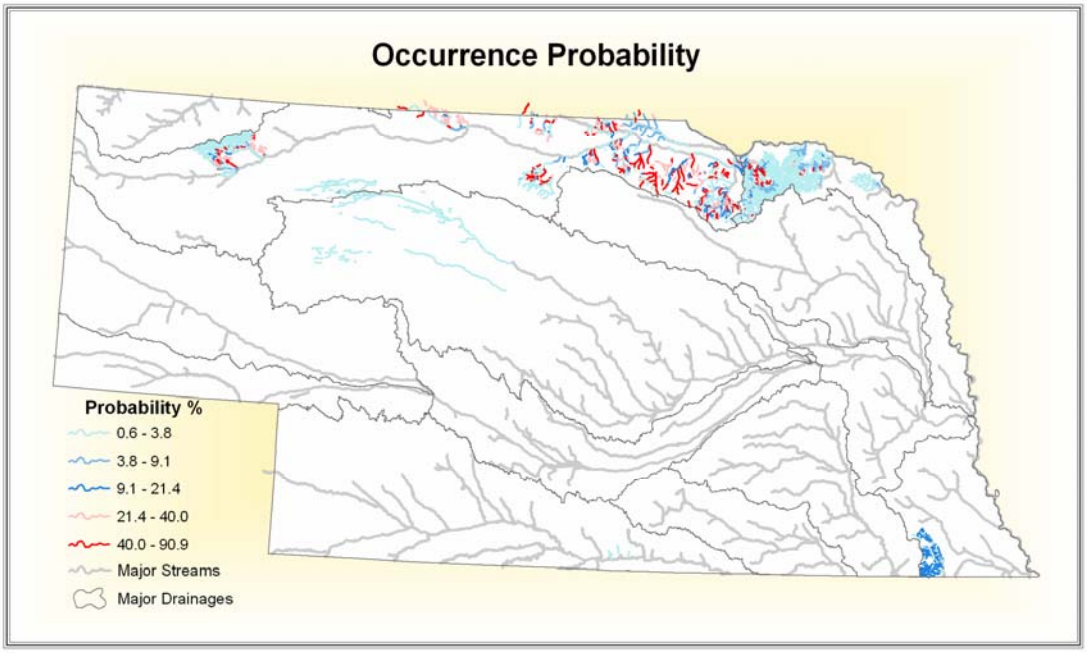
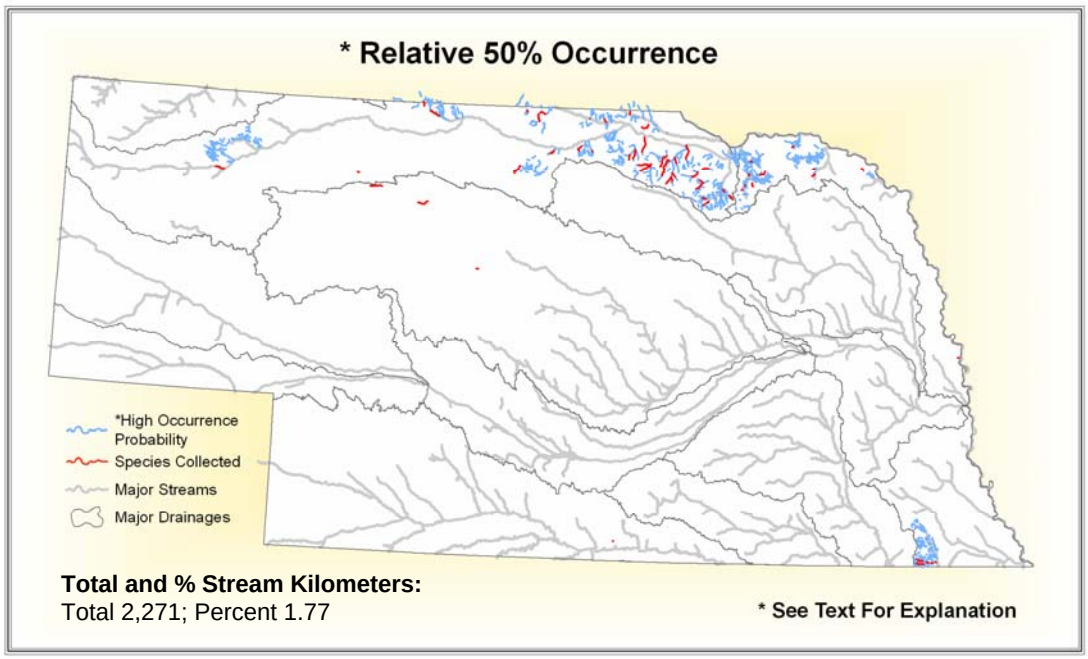
Blacknose Dace

Rhinichthys Atratulus

Native: Yes
State Rank: S2
Global Rank: G5

ITIS Code: 163382
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The blacknose dace's range in Nebraska includes much of the Niobrara drainage and small portions of the Loup and Nemaha drainages along with some northern Missouri River tributaries.

Habitat Affinities:

The blacknose dace generally require very clear perennial streams in order to survive, however they have been found in lakes and muddier streams. They are most commonly found in streams with gravel bottoms in pools. They usually feed on insects, algae and some invertebrates. Their spawning requires sandy or fine gravel bottoms (Tomelleri and Eberle 1988). The species can usually be found in small rivers in pools and slower runs (Lee 1980). They will rest on the bottom of the streams under stones and in the winter they will go to the deepest water next to banks. They will spawn in the ripples of gravelly areas (Scott and Crossman 1973).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 1%
Overall: 98%

References:

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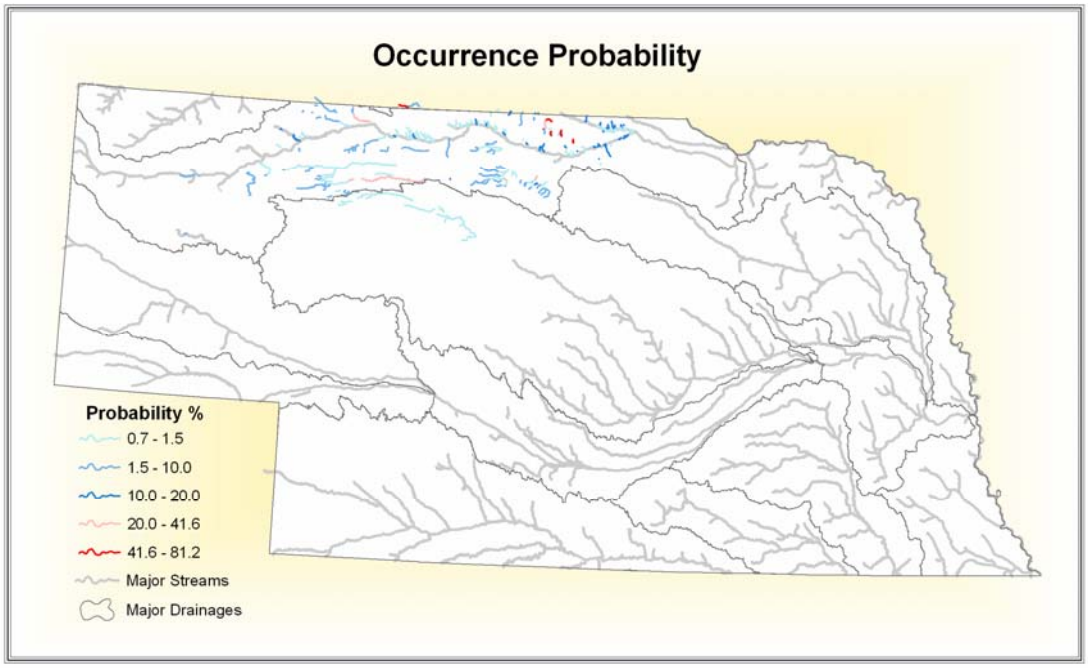
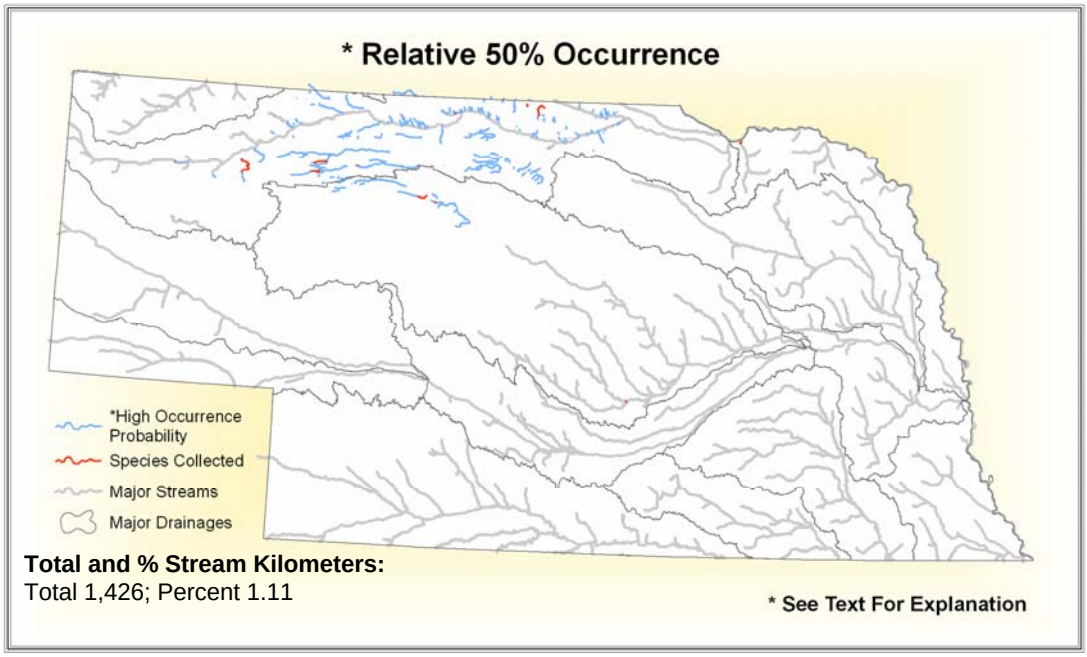
Blacknose Shiner

Notropis heterolepis

Native: Yes
State Rank: S2
Global Rank: G4

ITIS Code: 163446
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The blacknose shiner can be found in north central to northwest Nebraska in the tributaries of the middle Niobrara River and the upper Loup River.

Habitat Affinities:
Ideal habitats for the blacknose shiner are pools of small clear prairie streams of low gradients, aquatic vegetation and bottoms of clean sand, gravel, marl, muck, peat or organic debris (Pflieger 1997; Trautman 1957). In Minnesota it prefers clean, weedy lakes and streams in the glacial lakes region of the state (Phillips et. al. 1982).
The blacknose shiner is especially vulnerable to extirpation by pollution (Pflieger 1997), siltation and the decline of aquatic vegetation (Trautman 1957; Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 97%

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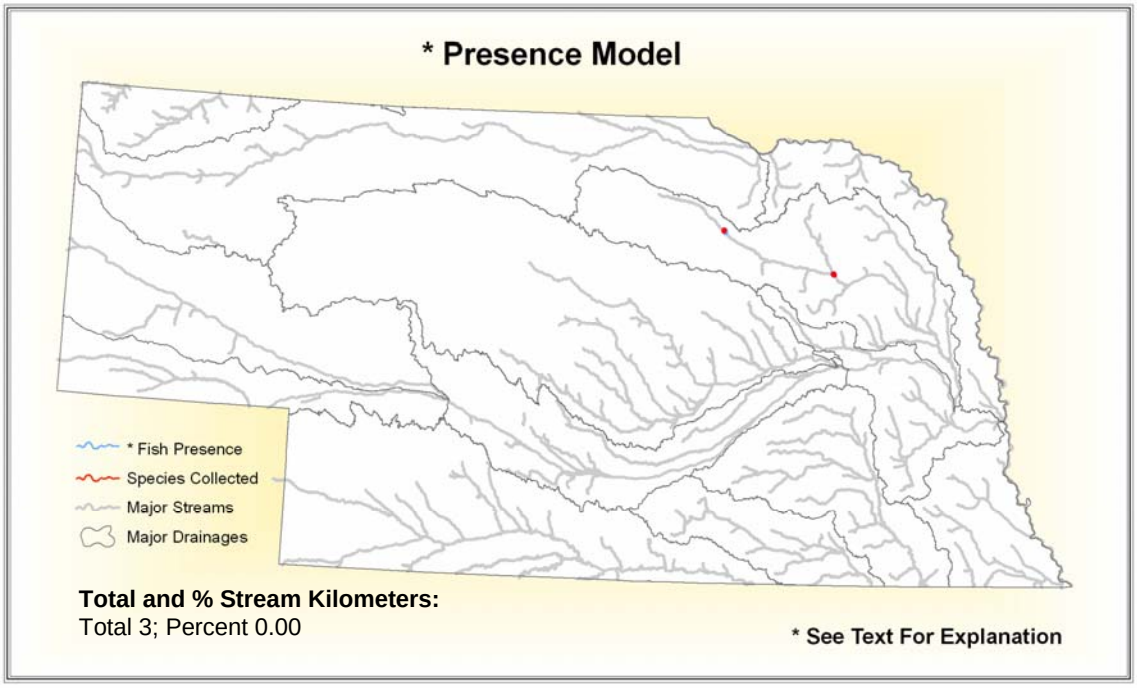
Blackside Darter

Percina maculata

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168488
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Possibly extirpated. Collections have been taken along the Elkhorn River near Dry Creek and North Fork Elkhorn River.

Habitat Affinities:
The main habitat of the blackside darter are pools and sluggish riffles (Clay 1975), particularly in areas of quickening and lessening currents connecting the pools and riffles, of medium-sized creeks and rivers with substrates ranging from sand to detritus, silt, boulders and rubble (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1971; Robinson and Buchanan 1988; Trautman 1957). The young occur in backwaters among accumulations of sticks, leaves and other debris (Pflieger 1997). The blackside darter is more tolerant of turbid and warmer waters than other darters (Pflieger 1997) but highly intolerant of considerable siltation (Etnier and Starnes 1993) and organic pollutants such as mine wastes (Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 0%
Overall: 100%

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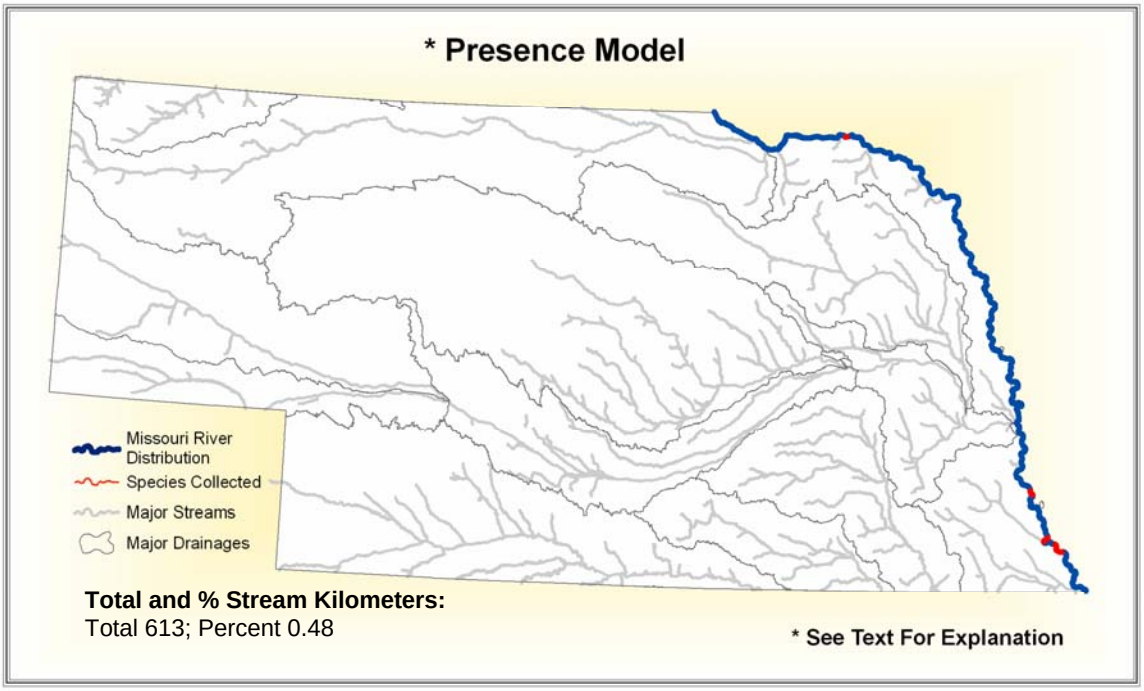
Blue Catfish

Ictalurus furcatus

Native: Yes
State Rank: SU
Global Rank: G5

ITIS Code: 163997
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The blue catfish can be found throughout the large waters of the Missouri River.

Habitat Affinities:
The blue catfish inhabits rivers, large permanent streams, swift chutes, over-bars, pools, runs, raceways, ponds, lakes and oxbows (Douglas 1974; Pflieger 1971; Trautman 1957). It is associated with 8th-9th order streams with moderate to swift current, in the main channel and the main channel border. The blue catfish avoids the silted bottoms of most sluggish pools, preferring firm substrates of bedrock, boulder, sand or gravel, but does inhabit the deep waters of large reservoirs (Etnier and Starnes 1993; Cross and Collins 1975; Pflieger 1971).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 3%
Overall: 96%

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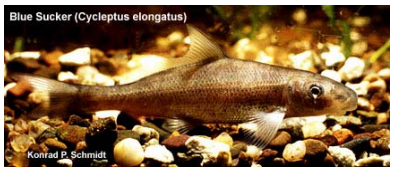
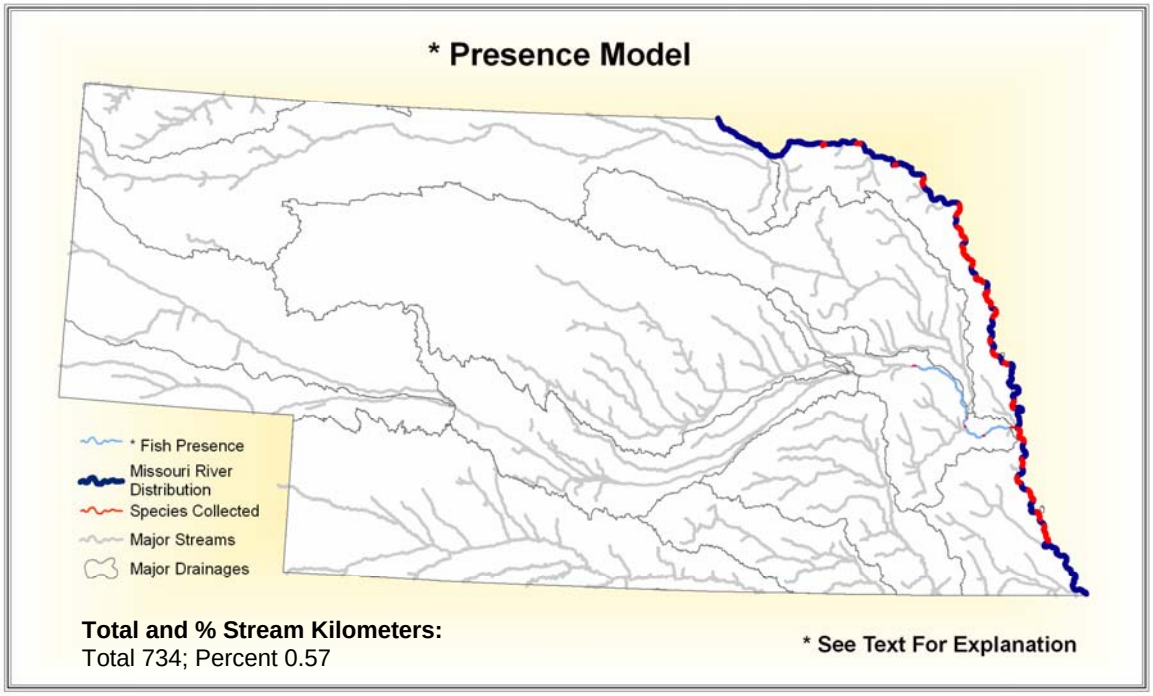


Blue Sucker

Cycleptus elongatus

Native: Yes
State Rank: S3
Global Rank: G3G4

ITIS Code: 163953
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The blue sucker was once very common in the state of Nebraska, however recent changes in the habitat of the species have made them less common. The blue sucker can be found in the large river systems of the state including the Missouri River and the lower portion of the main stem of the Platte River (Morris, Morris, and Witt 1974).

Habitat Affinities:
The blue sucker prefers the swift waters of big rivers overlying firm substrates such as sand, gravel or rock (Etnier and Starnes 1993; Pflieger 1997). Robinson and Buchanan (1988) found that it also inhabits the channels of deep lakes. Trautman (1957) found that it prefers channels and pools with moderate current. In Missouri the blue sucker is typically found where the channel is constricted by natural or artificial obstructions, including bedrock or boulder riffles, the tailwaters of dams, wing dikes and bridge abutments. As a migratory species, the blue sucker has declined in abundance since 1900 as dam construction has increased (Pflieger 1997). Dams have also limited the blue sucker's habitat by decreasing current velocity and increasing siltation (Pflieger 1971).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 3%
Overall: 97%

References:

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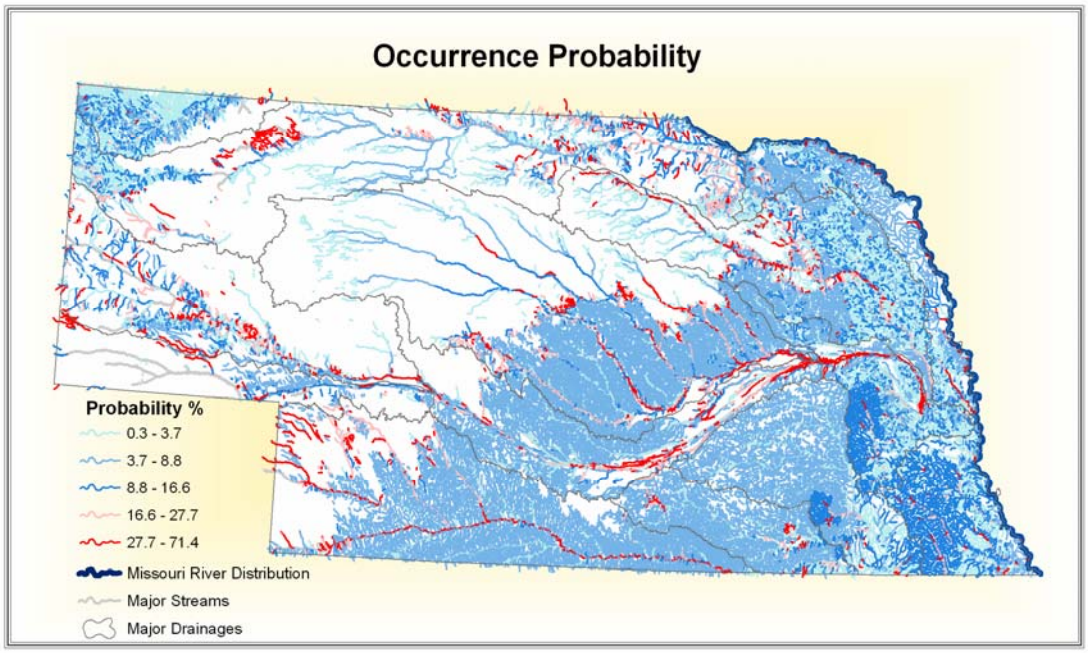
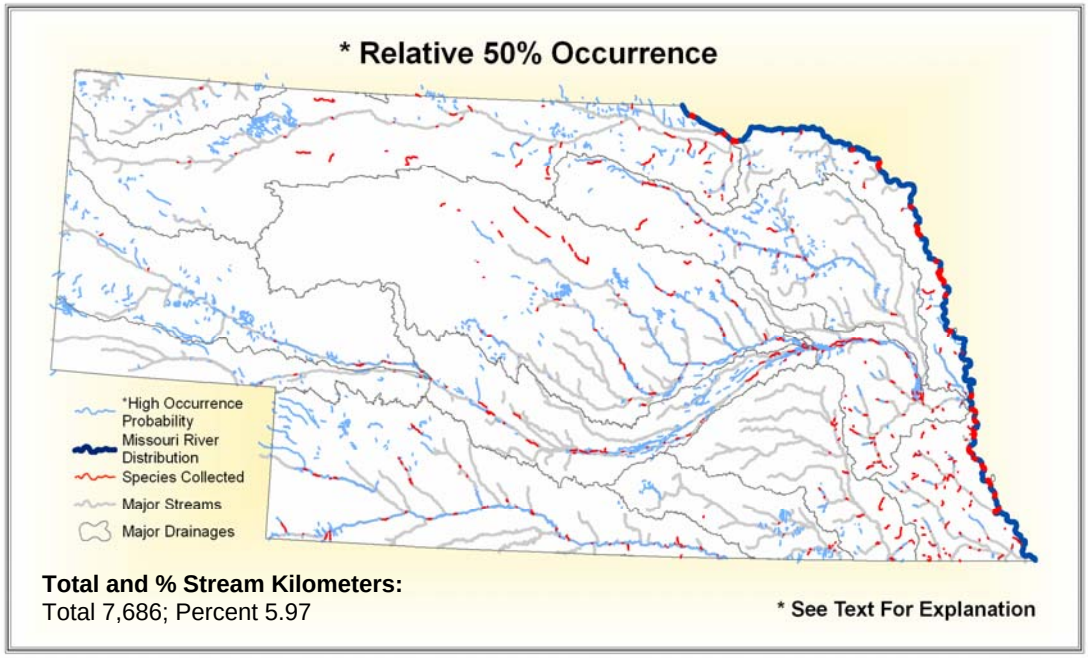
Bluegill

Lepomis macrochirus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168141
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 7,686; Percent 5.97

* See Text For Explanation

State Range:

Bluegill can be found across the entire state of Nebraska in almost any water type. They are known to be in almost all ponds, lakes, and reservoirs, and can be found in nearly all streams throughout the state (NatureServe 2006).

Habitat Affinities:
Aside from farm ponds and impoundments, the largest populations of bluegill are in warm pools and backwaters of low-gradient streams, and particularly in overflow pools along floodplains with some aquatic vegetation or other cover (Etnier and Starnes 1993; Trautman 1957). Pflieger (1997) notes that stream populations may be sustained by continuous escapement from impoundments. The bluegill is intolerant of continuous high-turbidity, siltation (Clay 1975; Pflieger 1971) and flowing waters (Douglas 1974; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 9%
Commission: 8%
Overall: 83%

References:

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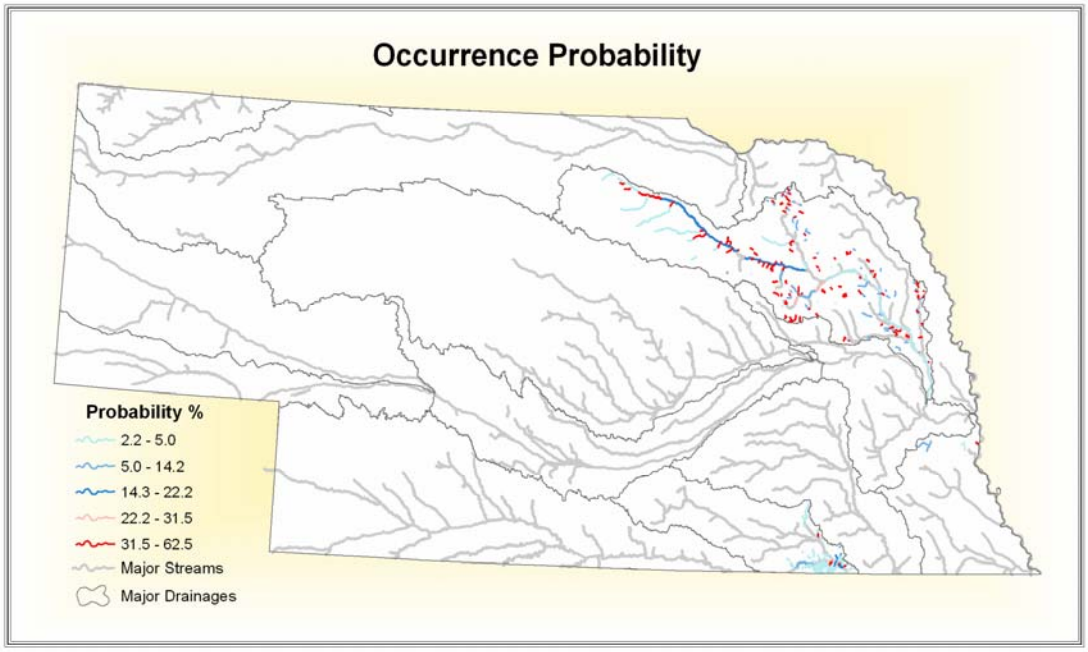
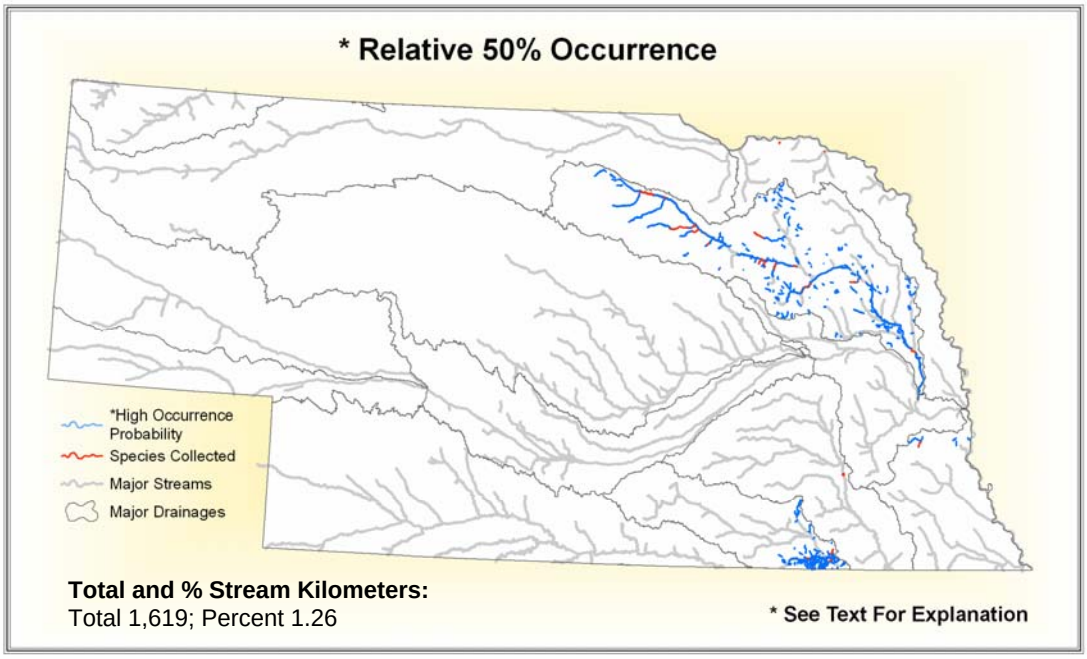
Bluntnose Minnow

Pimephales notatus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163516
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The bluntnose minnow is mainly found in the eastern portion of the state of Nebraska. They can be found throughout the Elkhorn River Drainage, in portions of the Nemaha Drainage, and also in parts of the Little Blue River Drainage (NatureServe 2006).

Habitat Affinities:
The bluntnose minnow can be in all types of waters but is most abundant in quiet pools and backwaters of moderate size streams and lakes having clear, warm water, permanent flow, gravel bottoms, and some aquatic vegetation. (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In cooler streams the bluntnose minnow prefers warmer backwaters off the main channel. Trautman (1957) found that the bluntnose minnow was most abundant in waters draining lands rich in organic matter and high in phytoplankton populations.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 98%

References:

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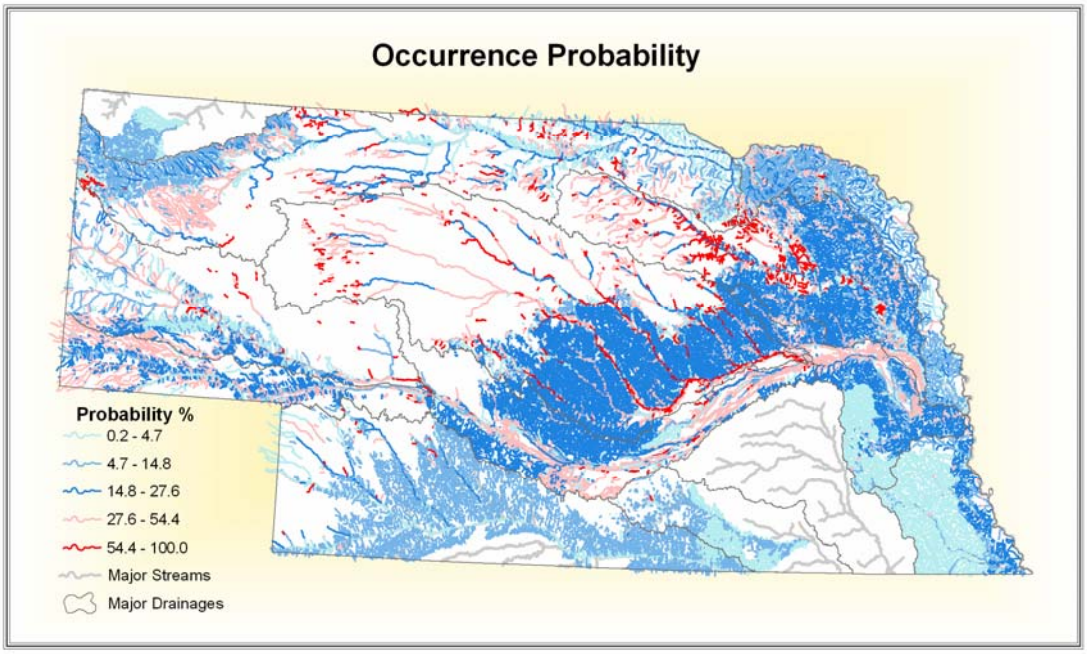
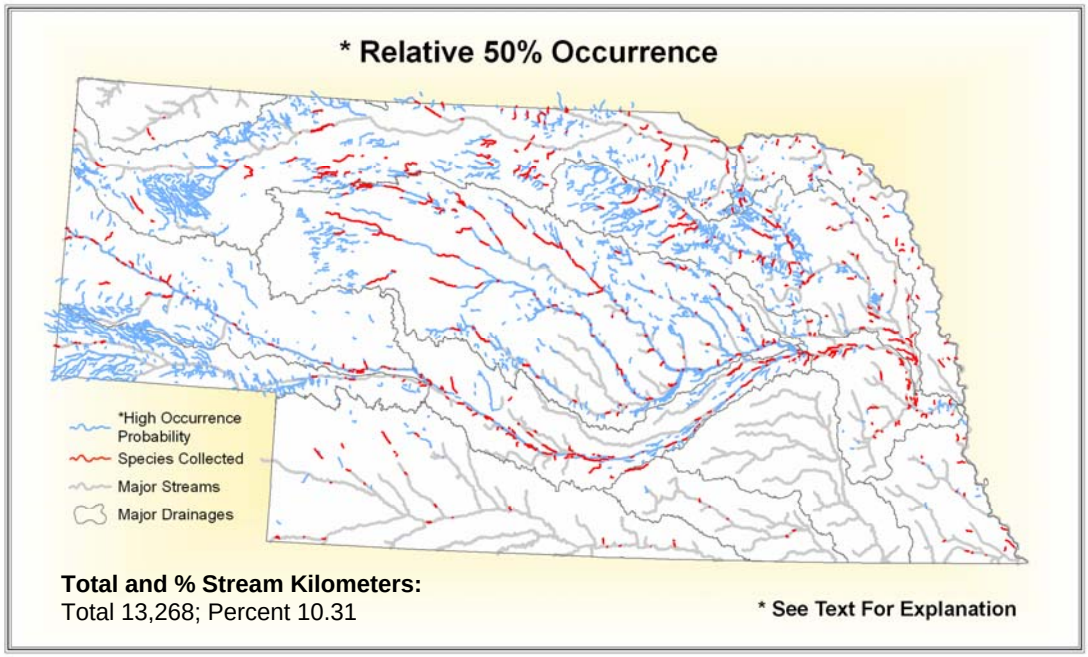
Brassy Minnow

Hybognathus hankinsoni

Native: Yes
State Rank: S3
Global Rank: G5

ITIS Code: 163363
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The brassy minnow can be found throughout Nebraska with the exception of the Big Blue River drainage, parts of the White-Hat drainage and a few areas in the Republican River drainage.

Habitat Affinities:
The brassy minnow can be found in small weedy pools or small, clear streams with moderate current and sandy bottoms covered with organic sediment (Cross and Collins 1975). In the Chariton drainage the largest populations can be found in small, moderately clear prairie creeks having permanent pools and sandy or gravelly bottoms (Pflieger 1997). The brassy minnow feeds on benthic algae by ingesting the organic-rich ooze that forms over the stream bottom (Eddy and Underhill 1974; Pflieger 1997), and spawns in quiet water in early spring (Eddy and Underhill 1974).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 13%
Commission: 6%
Overall: 81%

References:

Bailey, R. M. 1954. Distribution of the American cyprinid fish, *Hybognathus hankinsoni*, with comments on its original desription. *Copeia* (4):289-291.

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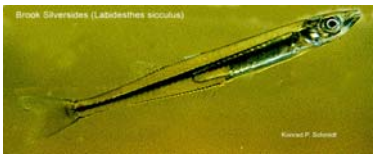
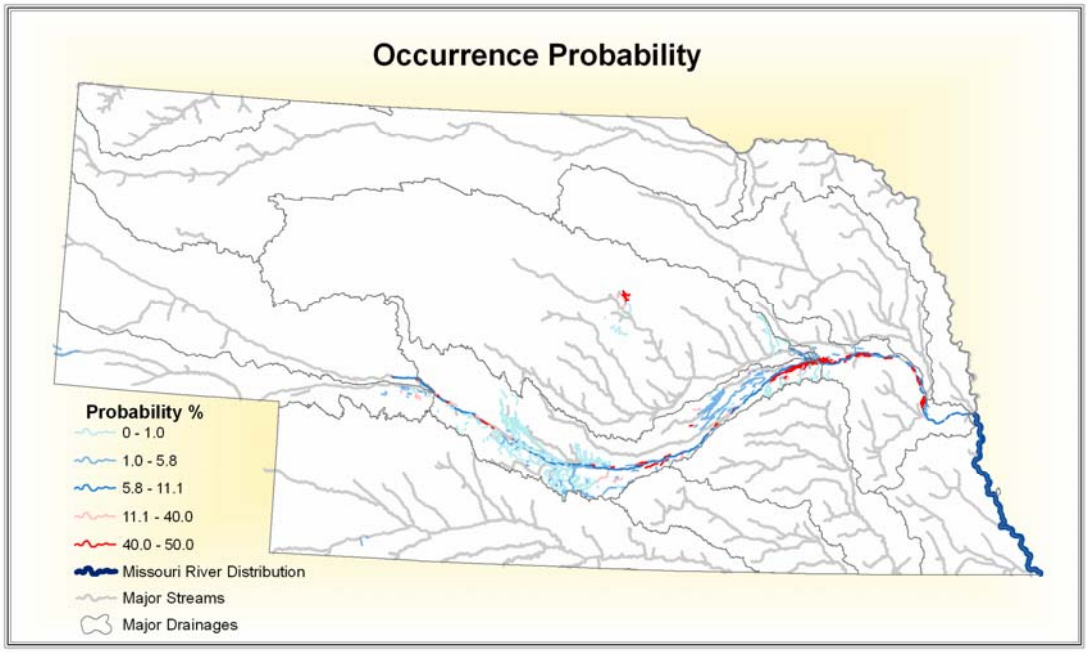


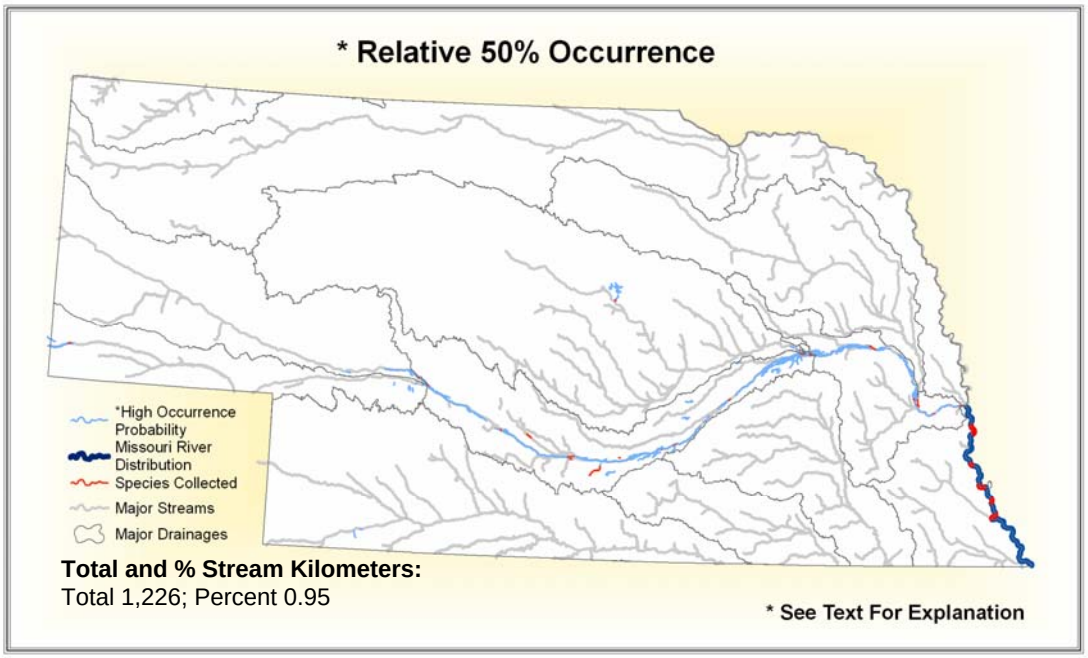
Brook Silverside

Labidesthes sicculus

Native: No
State Rank: S?
Global Rank: G5

ITIS Code: 166016
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The brook silverside can be found in a few scattered areas across the state of Nebraska, primarily along the middle Platte River extending down to the Missouri River. The species is also located in the Missouri River below the Platte River confluence.

Habitat Affinities:
The brook silverside prefers clear, warm backwaters of streams, lakes, bayous, oxbows and borrow bits with bottoms composed of clean sand, gravel or organic muck (Cross and Collins 1975; Douglas 1974; Pflieger 1997;Trautman 1957). The brook silverside is most often found in warm, permanent pools of small headwater creeks and overflow pools of larger streams with little current (Pflieger 1971 and 1997). However Cross and Collins 1975 and Clay 1975 report that the brook silverside inhabits small streams with considerable current. In the clear waters of lakes and newly constructed reservoirs it prefers coves or shorelines (Pflieger 1997; Trautman 1957). The brook silverside is sensitive to high turbidity (Clay 1975; Trautman 1957) and siltation (Pflieger 1971).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 3%
Overall: 97%

References:

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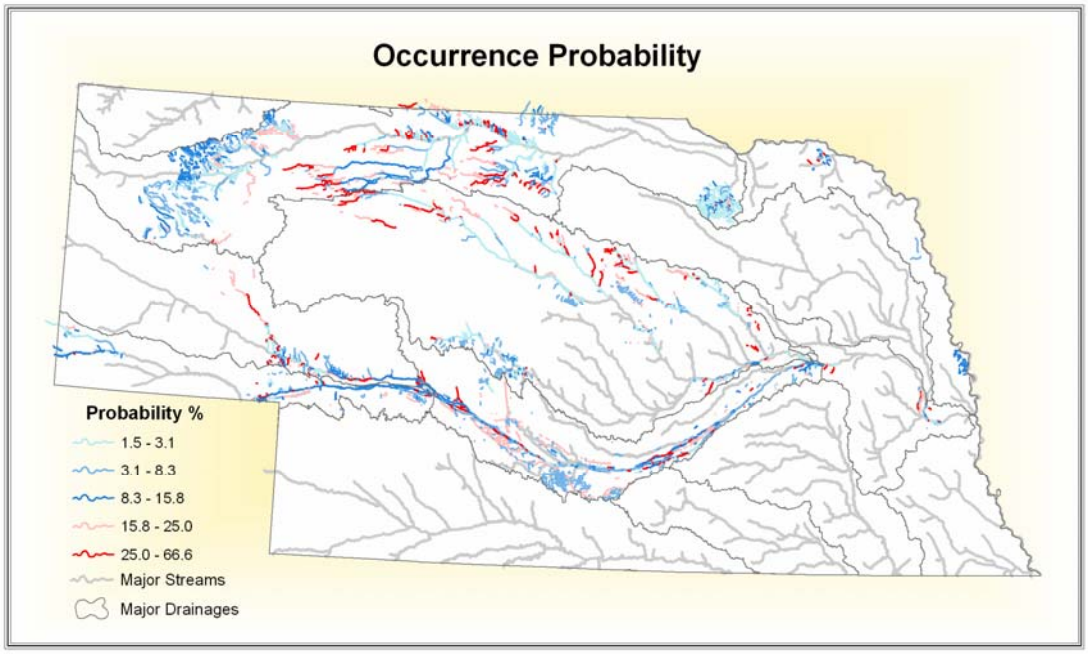
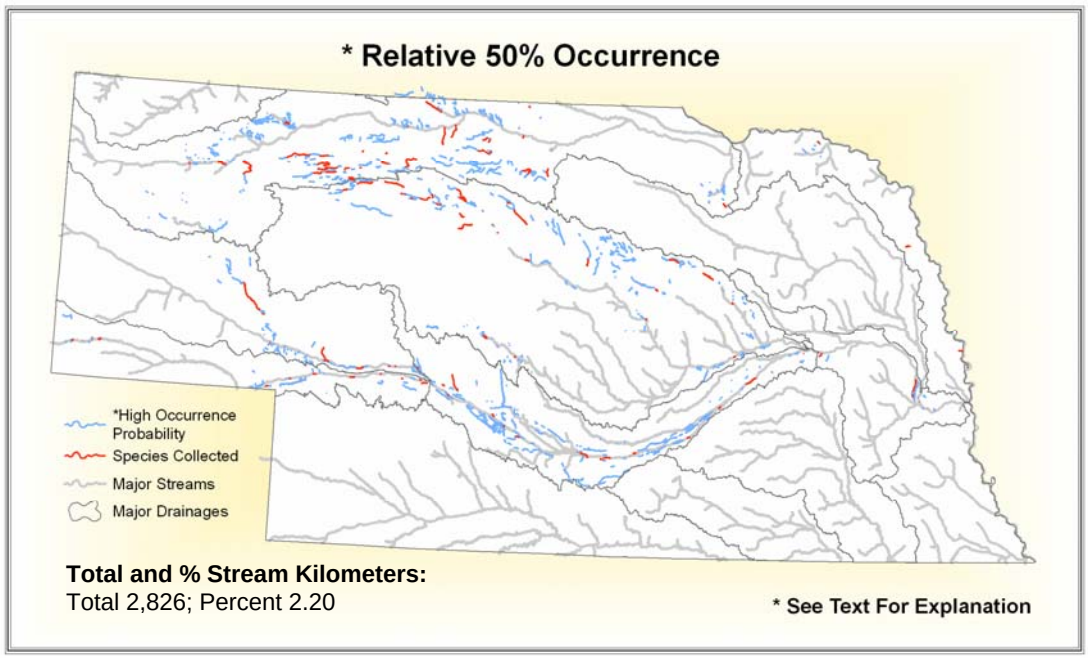
Brook Stickleback

Culaea Inconstans

Native: Yes
State Rank: S3
Global Rank: G5

ITIS Code: 166399
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The brook stickleback is generally found in the northern portion of Nebraska from a few scattered streams (Morris, Morris and Witt 1974). The primary drainages that the brook stickleback inhabits are the Loup, Middle Platte and Niobrara with smaller distributions in the Lower Platte, Missouri River tributaries, North Platte and the South Platte drainages.

Habitat Affinities:

Brook Sticklebacks generally require cold clear water streams, some ponds and shallow areas of lakes. They are usually found around high amounts of vegetation, such as in seepage areas or in marshland areas. Their diet consists mainly of insects and invertebrates but they also eat eggs and algae (Tomelleri and Eberle 1988). They can usually be found in quiet areas with flowing pools that run over sand or mud. The species also sometimes burrows into the mud on the bottom of the streams (nature serve 2006).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 3%
Commission: 1%
Overall: 96%

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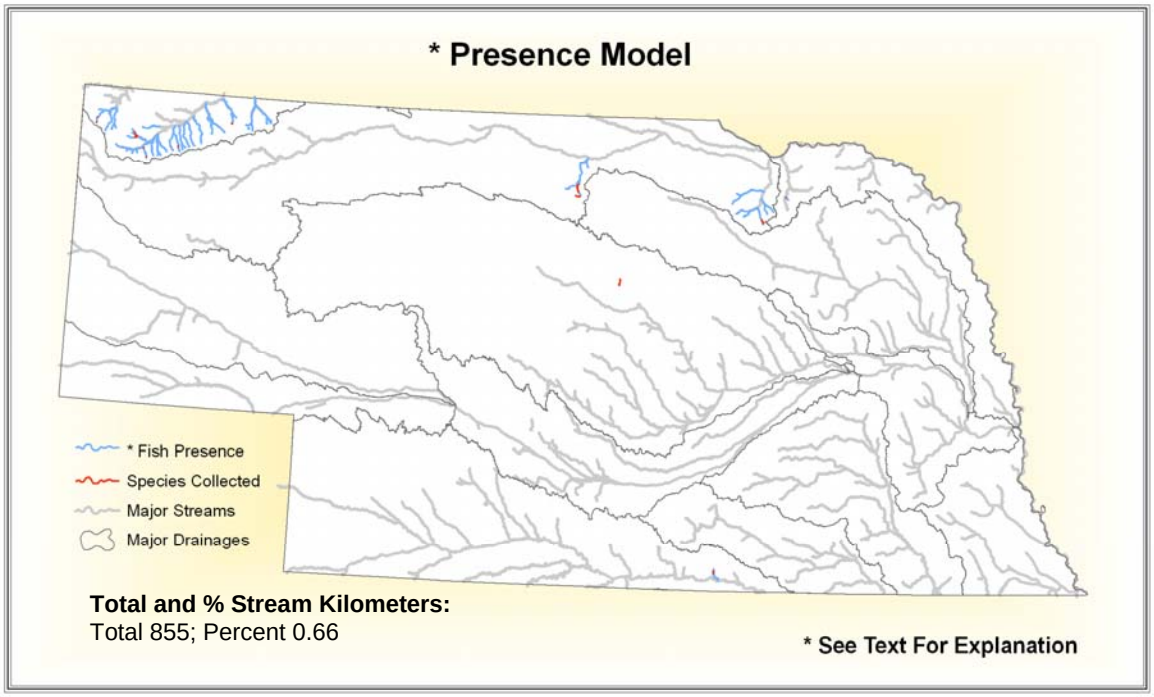
Brook Trout

Salvelinus Fontinalis

Native: No
State Rank: SNA
Global Rank: G5

ITIS Code: 162003
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The brook trout are an import from the East Coast and are currently found in streams that contain very cold water (Nebraka Game and Parks Commission, undated material). The two drainages with the broadest distribution of brook trout are the White-Hat and the Niobrara.

Habitat Affinities:

Brook trout require a very pristine environment to live in; any pollution in the streams can cause much of the population to die out. The streams in which they reside are usually very cold and have ample flow. The streams are usually connected to larger lakes. They mainly eat insects but smaller fish are also options (Tomelleri and Eberle 1988). Other places that the species can inhabit are small to medium rivers and lakes where they usually go to avoid high temperatures. The ideal water temperature of the brook trout is between 14 and 16 degrees Celsius (Sublette 1990). They usually spawn in gravelly areas at the headwaters of streams, but have been known to spawn in lakes where current or flow is present (Quinn 1995).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 3%
Overall: 97%

References:

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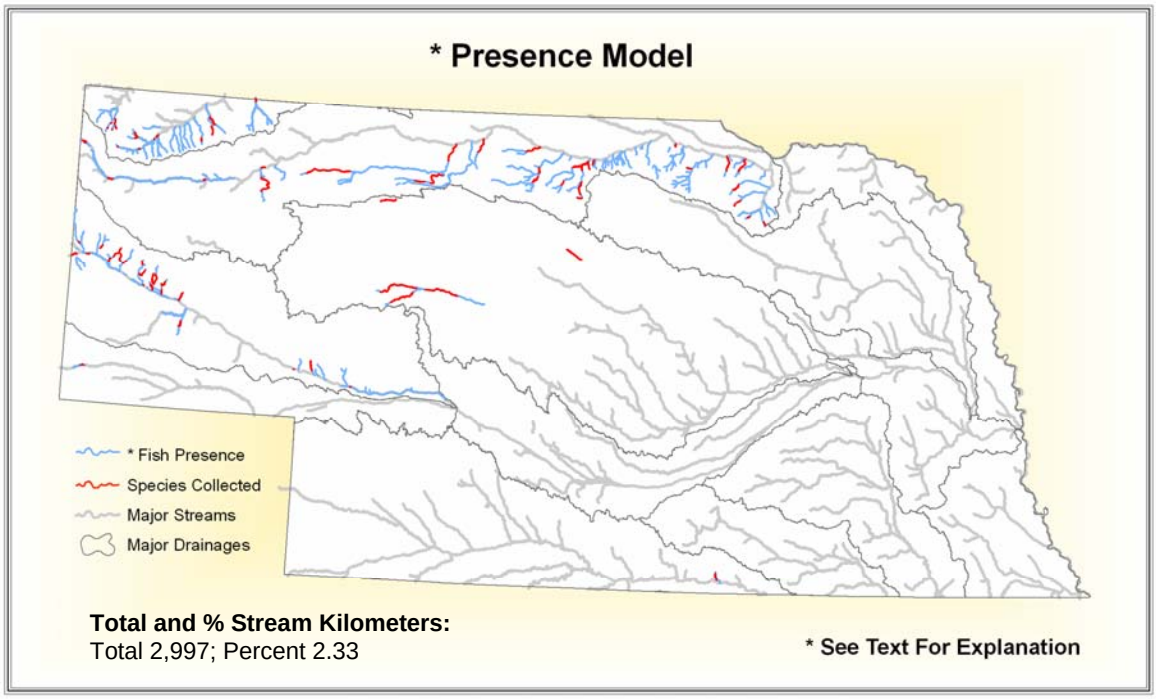
Brown Trout

Salmo trutta

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 161997
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

In Nebraska the brown trout can generally be found scattered throughout the north and west portions of the state and is the most abundant trout species in streams (Nebraska Game and Park Commision, undated material). Originally imported from Europe the brown trout today inhabits many of the cold water streams within the White-Hat, Niobrara, North Platte, and the Loup drainages (Nebraska Game and Parks Commission, undated material).

Habitat Affinities:
The brown trout thrives in clear, coldwater streams and in lakes to a lesser extent. It is typically found in streams around dense cover, such as submerged logs, undercut banks or in deep water below riffles (Pflieger 1997). In can be found in similar places throughout the Midwest where it is stocked.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 7%
Overall: 93%

References:

Allen, K. R. 1951. The Horokiwi Stream. a study of a trout population. New Zealand Marine Department Fisheries Bulletin 10:231 pp.

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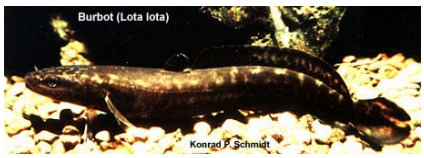
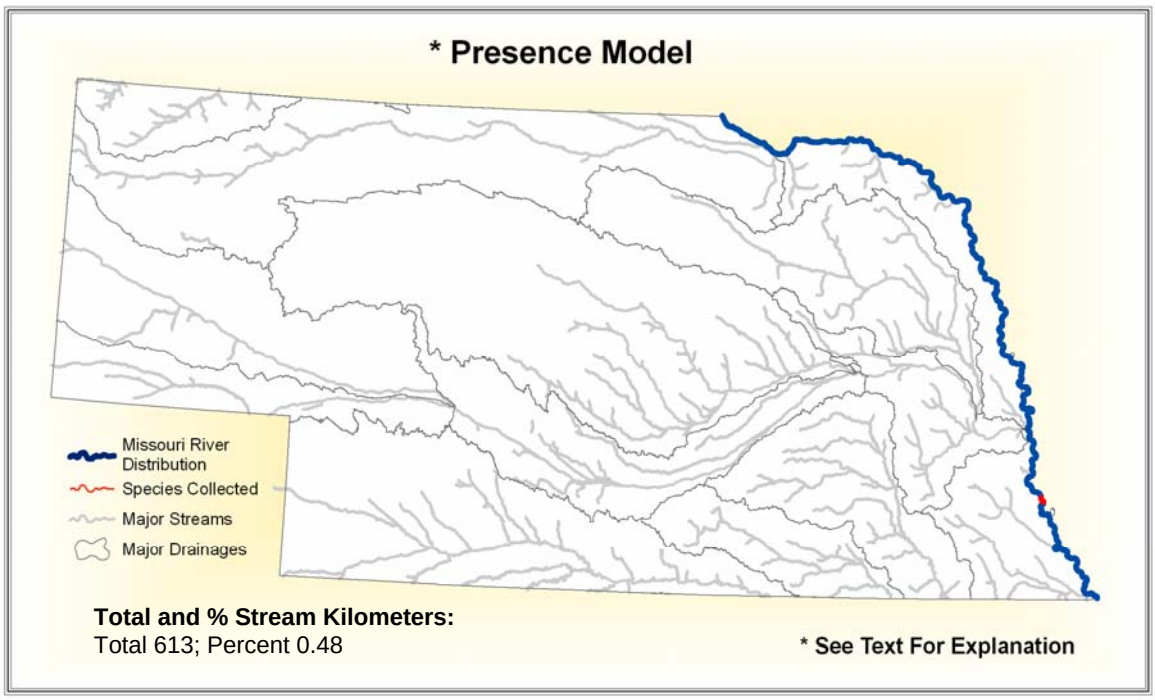
Burbot

Lota lota



Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164725
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The burbot is located almost exclusively in the Missouri River in Nebraska.

Habitat Affinities:
The burbot is usually found in deep, cold waters of lakes but may also occur in large rivers (Trautman 1957; Etnier and Starnes 1993). It is secretive, hiding about piles of rocks, submerged logs, undermined bridge supports and beds of aquatic vegetation during the daylight hours (Robins and Deubler 1955). In Ohio it is found in the deep, cold waters of Lake Erie, moving into shallower water near tributary outflows in winter (Trautman 1957). Juveniles are often found along rocky shorelines and in the mouths of tributaries (Scott and Crossman 1973). In Minnesota the burbot is common in large northern lakes and rivers (Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

References:

Bailey, M.M. 1972. Age, growth, reproduction and food of the burbot, *Lota lota* (Linnaeus), in southwestern Lake Superior. Transactions of the American Fisheries Society 101(4):667-674.

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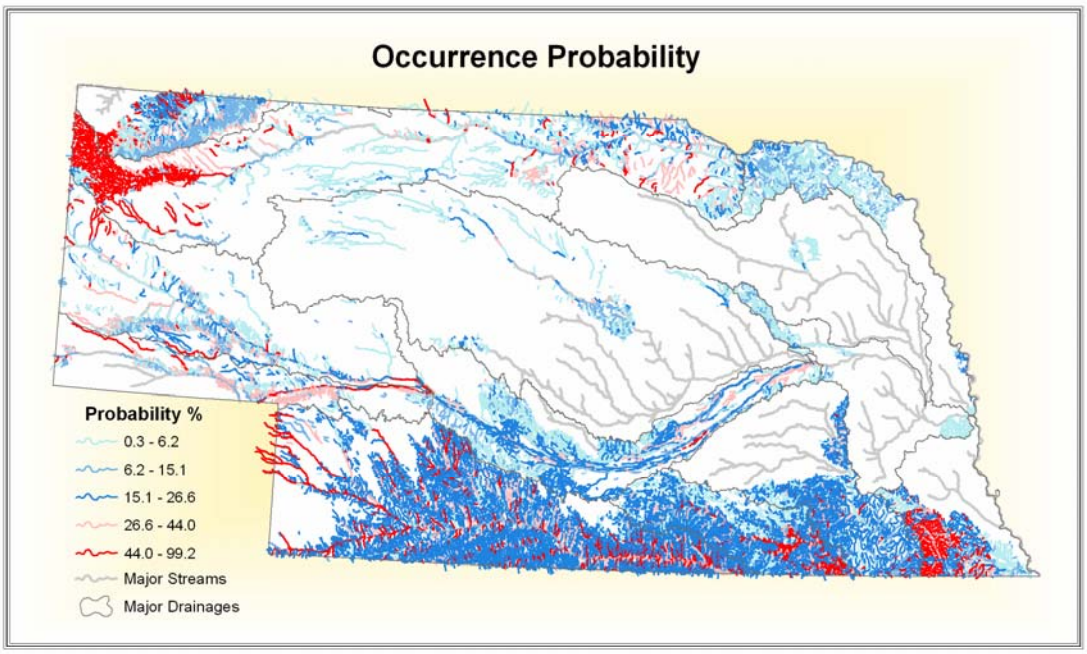
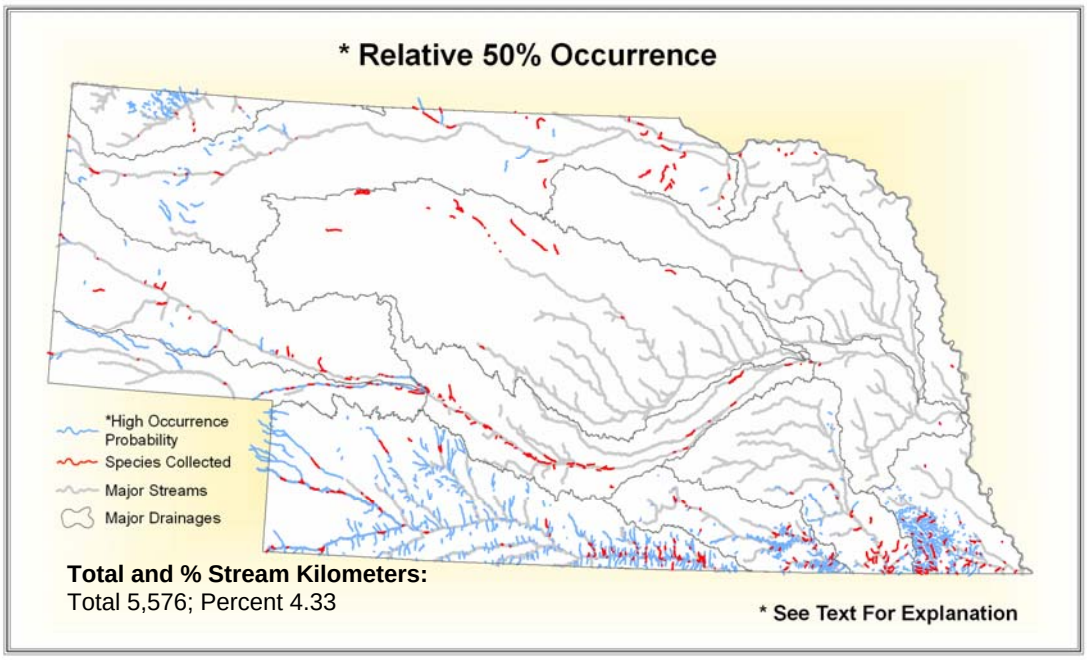
Central Stoneroller

Campostoma anomalum

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163508
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The central stoneroller can be found in varied locations throughout Nebraska. The range generally includes all parts of the state excepting areas in central and eastern Nebraska. They are generally absent from the Elkhorn and Lower Platte drainages and are not found in large areas in the Loup, Nemaha and upper Big Blue drainages.

Habitat Affinities:
The central stoneroller occurs in a variety of habitats ranging from very small streams to large rivers (Etnier and Starnes 1993). However Trautman (1957) noted that the largest populations were found when a combination of habitats was available. These varied habitats include the availability of many small streams having moderate to high gradients with sandy-gravel bottoms in which to spawn, moderate-sized streams with moderate gradients in which to summer, and lower gradients in the larger streams in which to winter. Robinson and Buchanan (1988) found that small populations could occasionally be found in upland impoundments as well. Finally, the central stoneroller prefers clear water but can tolerate turbidity if the bottom is free of silt (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 9%
Commission: 3%
Overall: 88%

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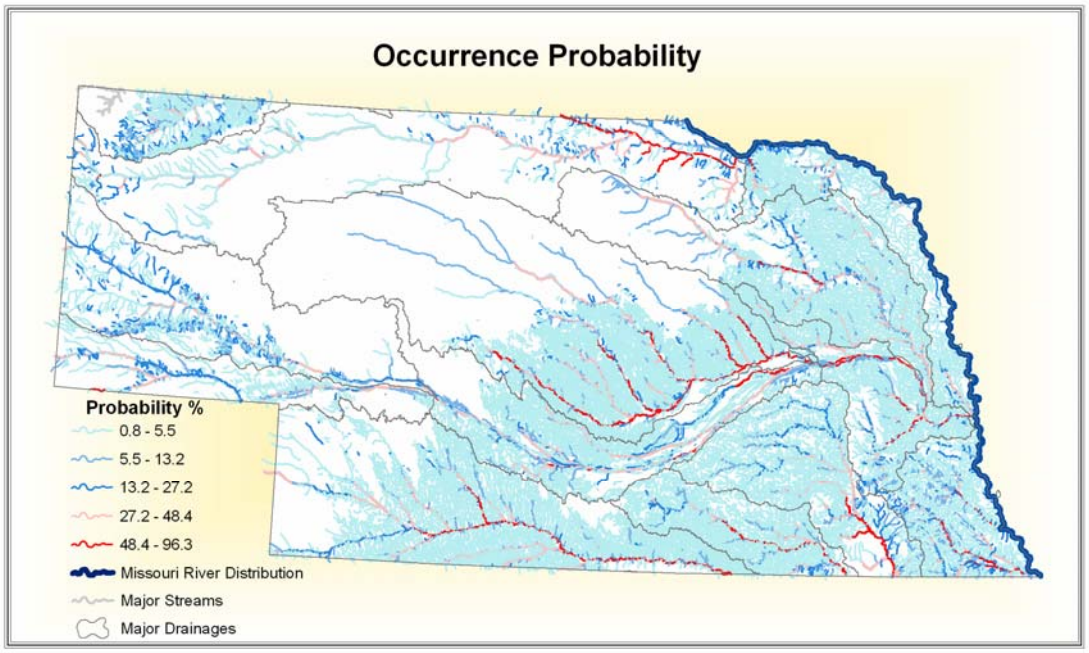
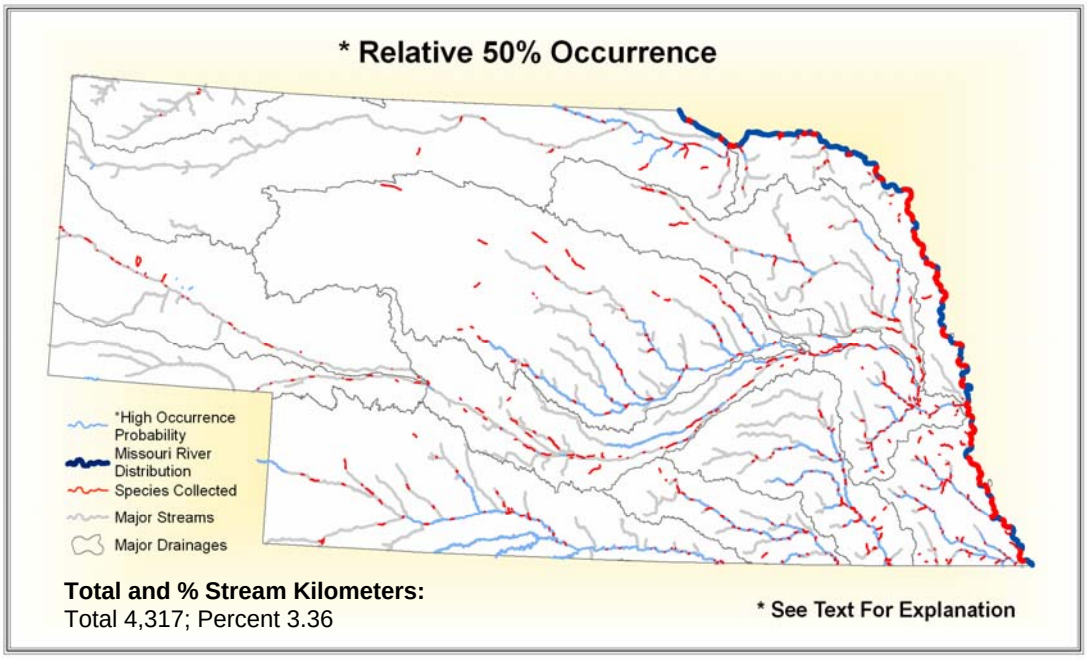
Channel Catfish

Ictalurus punctatus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163998
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The channel catfish can be found throughout the entire state from the big river systems to smaller ponds. The only place that the species is somewhat absent is in the White-Hat drainage around Indian Creek and parts of the Hat Creek.

Habitat Affinities:
The channel catfish is found in many types of habitats ranging from ponds, lakes and reservoirs to rivers, oxbows and bayous. It is highly abundant in the deeper waters of impoundments and large streams having moderately clear bottoms of sand, gravel or boulders and sometimes silt, provided the rate of deposition is low (Pflieger 1997; Trautman 1957). The channel catfish is extremely adaptable (Etnier and Starnes 1993; Robinson and Buchanan 1988), as it does not require flowing water at any point in its life cycle or the availability of live food (Cross and Collins 1975). Adults seek cover around submerged logs, steep cutbanks or drift piles during the day (Cross and Collins 1975; Pflieger 1997), and feed in riffles and shallow pools at night (Robinson and Buchanan 1988). The channel catfish avoids clear cool streams, streams with high gradient (Pflieger 1971), and dense beds of aquatic vegetation (Trautman 1957). Yearlings can tolerate considerable current and are often found in riffles or shallow pools (Trautman 1957; Pflieger 1971).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 11%
Commission: 5%
Overall: 83%

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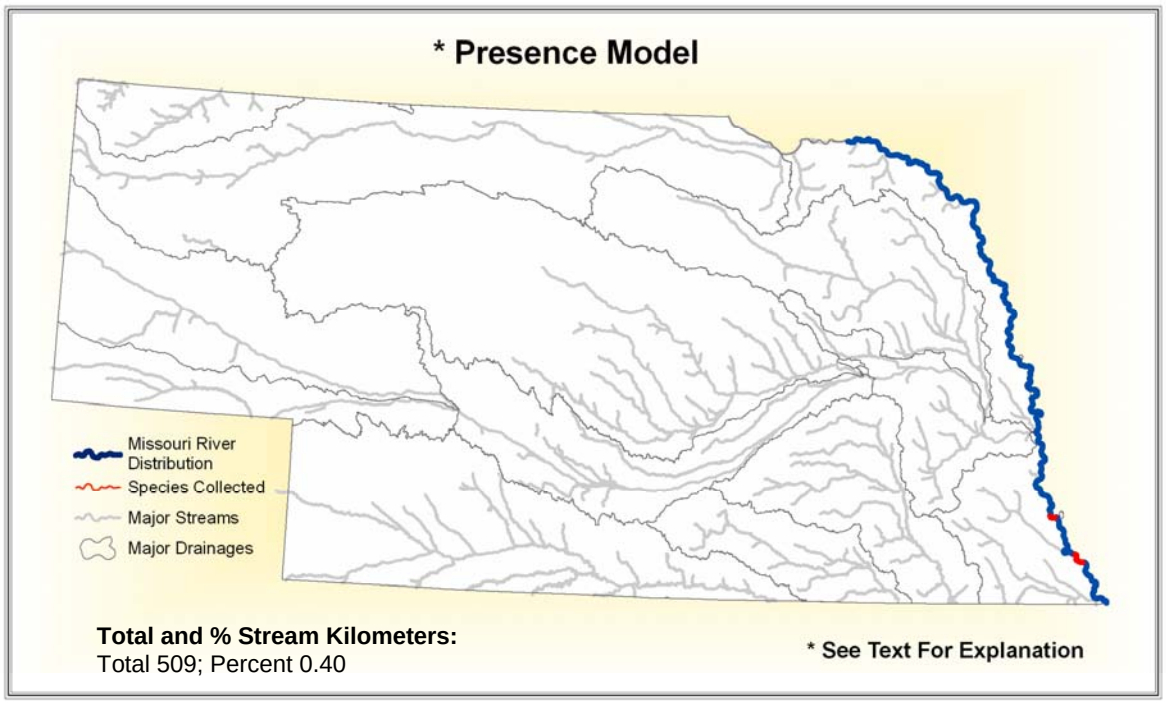
Chestnut Lamprey

Ichthyomyzon castaneus

Native: Yes
State Rank: S?
Global Rank: G4

ITIS Code: 159725
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The chestnut lamprey can usually only be found in the Missouri River in the state of Nebraska (Morris, Morris and Witt 1974). Found in the Missouri River below Gavin's Point Dam.

Habitat Affinities:
The chestnut lamprey moves among different habitats through its life cycle. Adults are common in large streams and reservoirs, where, as parasites, they can find an abundance of fishes on which to feed (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes, 1993; Cross and Collins 1975). Spawning adults can be found in medium creeks to large rivers, and larvae need clear streams with permanent flow, with stable bars of sand, silt, and organic matter (Pflieger 1997). The chestnut lamprey's variety of habitat is illustrated by the fact that Cross and Collins (1975) assert that it is found in large rivers, while Phillips et. al. (1982) state that it tends to occupy smaller rivers and streams.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 3%
Overall: 97%

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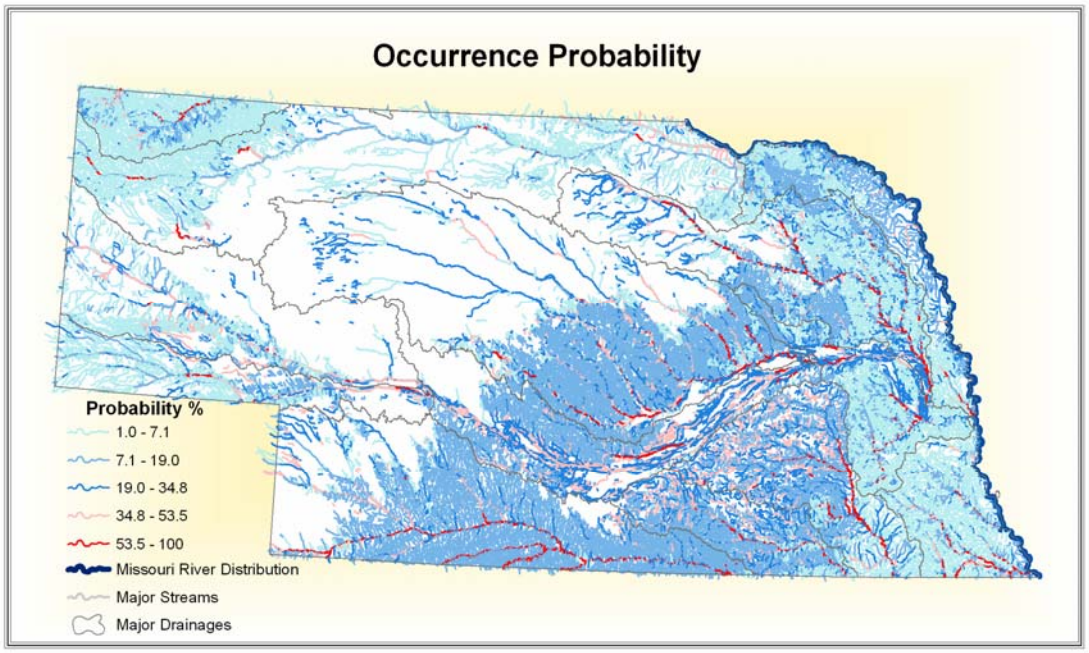
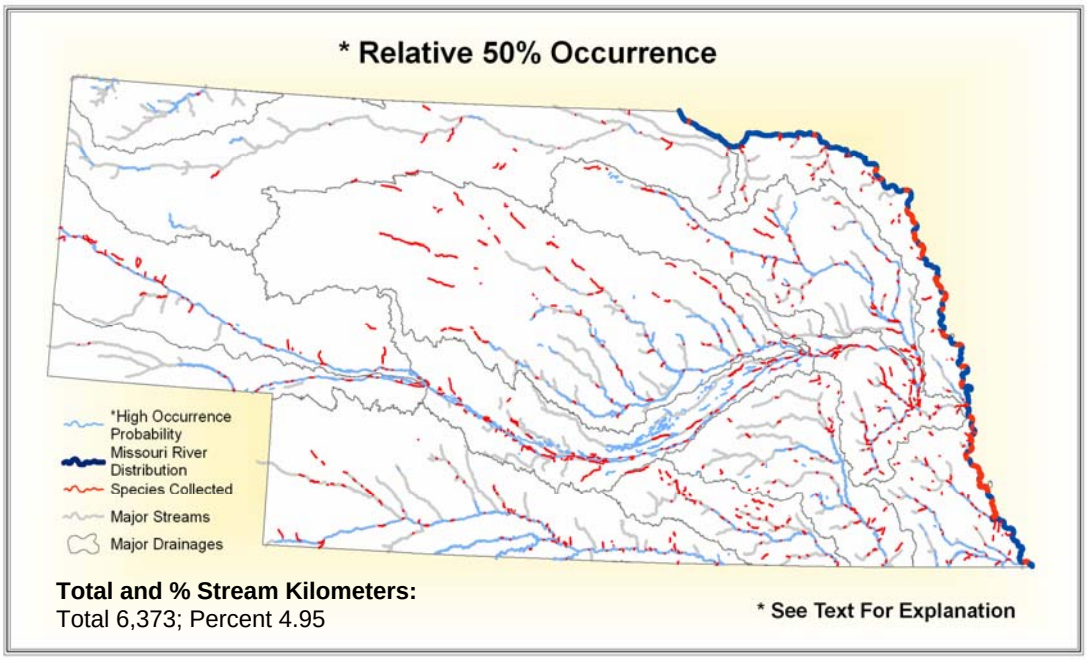
Common Carp

Cyprinus carpio

Native: No
State Rank: SNA
Global Rank: G5

ITIS Code: 163344
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The common carp can be found throughout the state of Nebraska.

Habitat Affinities:
The common carp is extremely adaptable and can be found in a variety of habitats, however it is least successful in clear, high gradient streams. It is abundant in low-gradient, warm waters of lakes, reservoirs (Pflieger 1997), and the soft-bottomed, weedy pools of streams (Robinson and Buchanan 1988). Especially high populations can be found in lakes and reservoirs that are artificially fertilized with organic wastes or runoff from farmlands with essentially eutrophic conditions (Pflieger 1997; Trautman 1957). The common carp is often found about piles of drift, logs or other submerged cover. It is tolerant of a wide range of turbidities, bottom types and temperatures (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 18%
Commission: 8%
Overall: 75%

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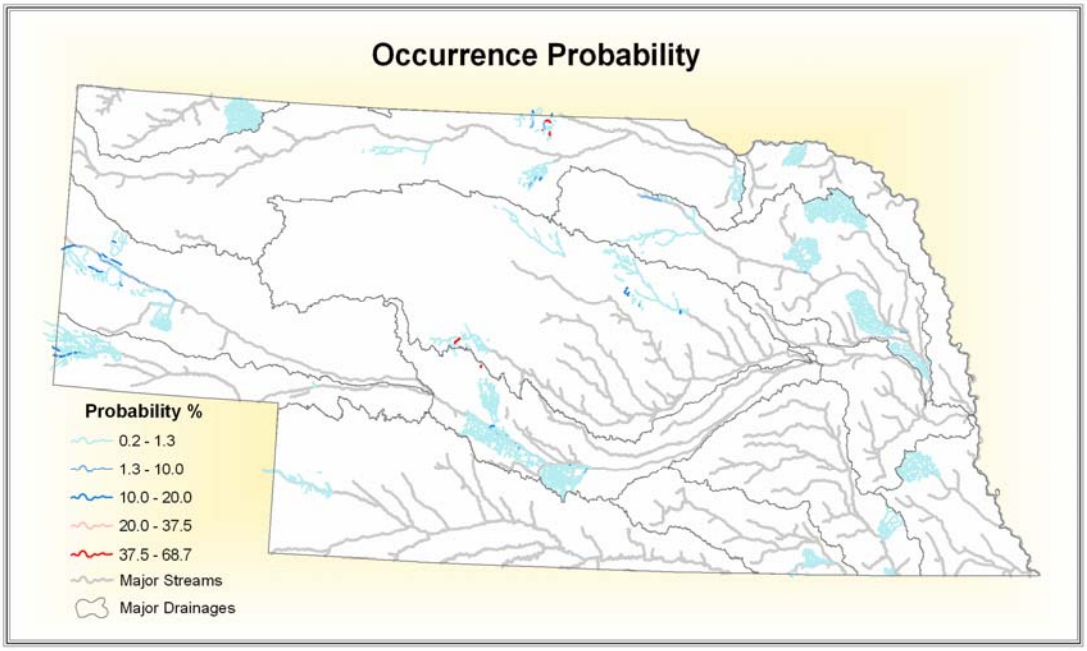
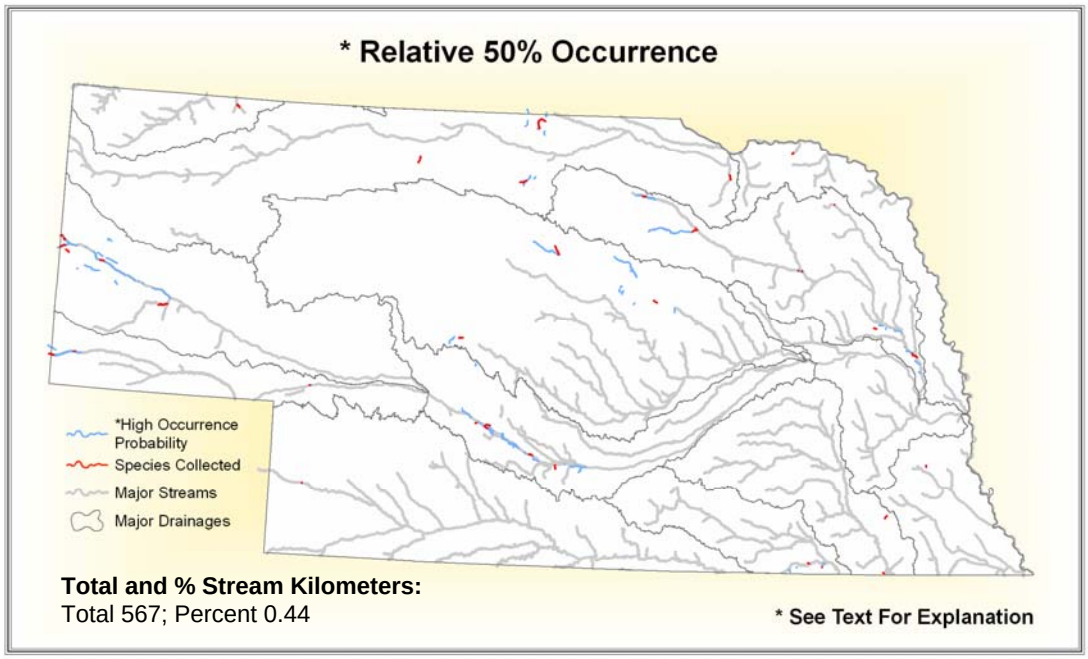
Common Shiner

Luxilus cornutus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163836
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The common shiner has a spotty distribution pattern across the state of Nebraska. They can be found in select areas across the state and in every major drainage.

Habitat Affinities:
The common shiner inhabits high-gradient streams of medium-size with moderate to swift current, clear, cool, weedless water, bottoms of gravel, rubble and bedrock. It is found in the pools of streams where riffles and pools alternate in rapid succession (Cross and Collins 1975; Pflieger 1997). As flow decreases late into summer, streams of this type are reduced to a series of isolated pools but water continues to percolate through the gravel between pools (Pflieger 1997). Adults and young migrate downstream after spawning to winter in larger, deeper waters with lower gradients (Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 1%
Overall: 98%

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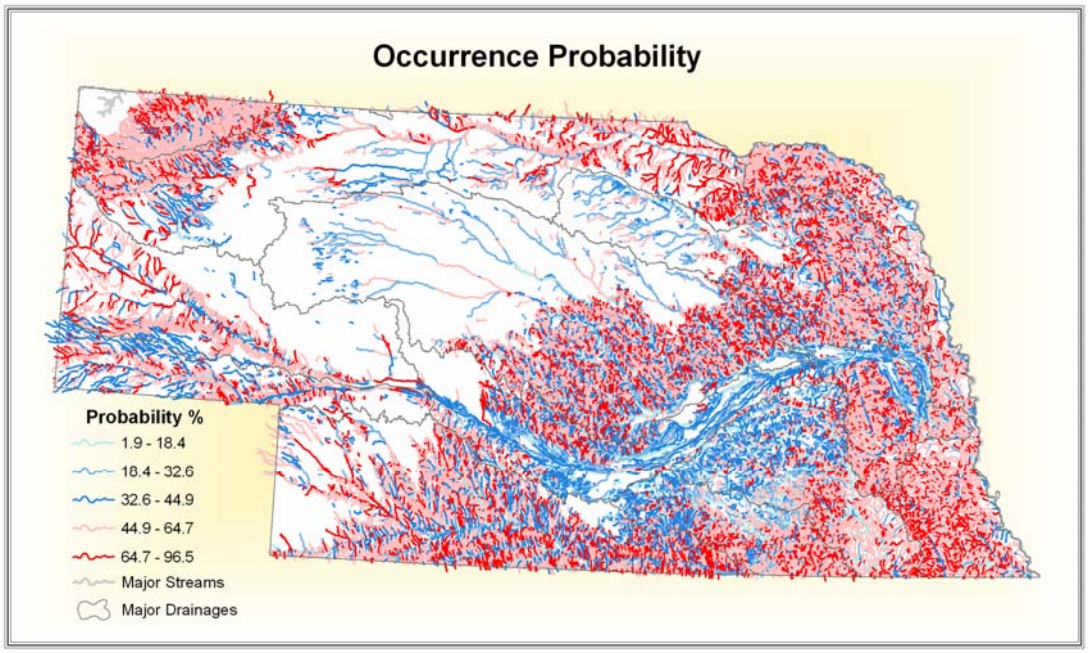
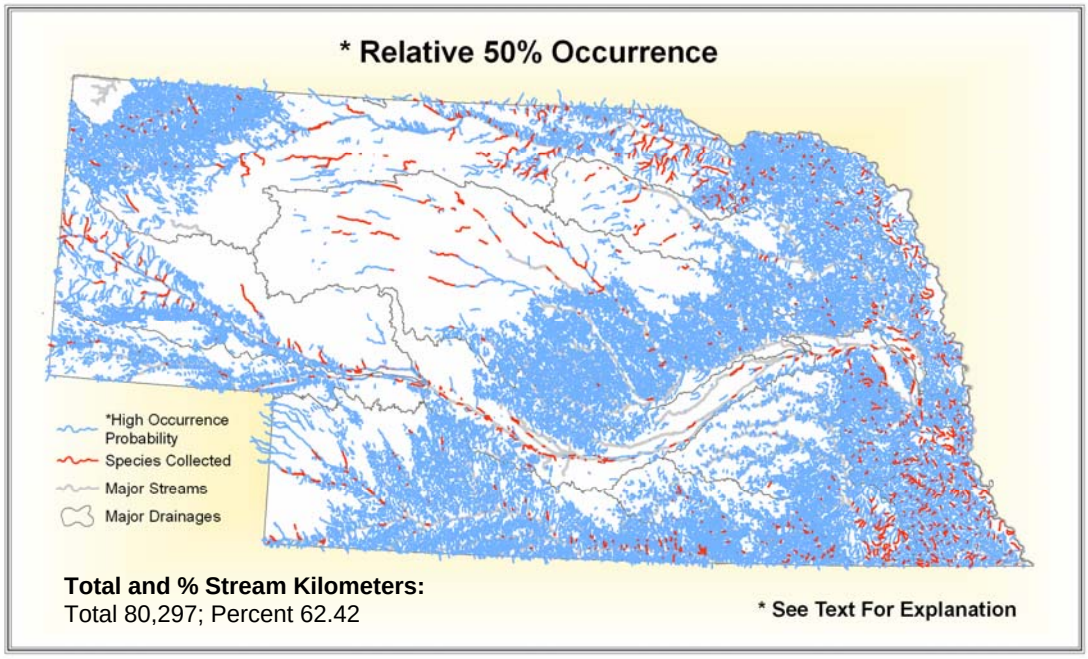
Creek Chub

Semotilus atromaculatus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163376
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The creek chub can be found almost statewide in Nebraska. The only area that is devoid of creek chub is the Hat Creek watershed in northwest Nebraska.

Habitat Affinities:
Trautman (1957) states that the creek chub was found in all ponds, reservoirs, and lakes, but concurs with other researchers that the majority of creek chubs inhabit small, often intermittent, headwater creeks where few other fishes are present (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Douglas 1974; Cross and Collins 1975; Eddy and Underhill 1974; Clay 1975). Its population may increase when human activity reduces the population of competing species (Robinson and Buchanan 1988). The creek chub frequents streams with alternate riffles and pools rather than continuous strong flow, occurring where there are sufficient holes, brush, roots, or other cover for retreat if threatened (Pflieger 1997; Clay 1975; Trautman 1957; Etnier and Starnes 1993). It is most abundant in streams of high gradient with gravelly bottoms, requiring flow for spawning and gravel in which to build nests (Douglas 1974; Pflieger 1997; Trautman 1957; Clay 1975; Robinson and Buchanan 1988). It can tolerate turbidity if there is enough gradient to create gravelly areas, noting that a scarcity of gravelly bottoms may limit the creek chub's distribution (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 16%
Commission: 16%
Overall: 68%

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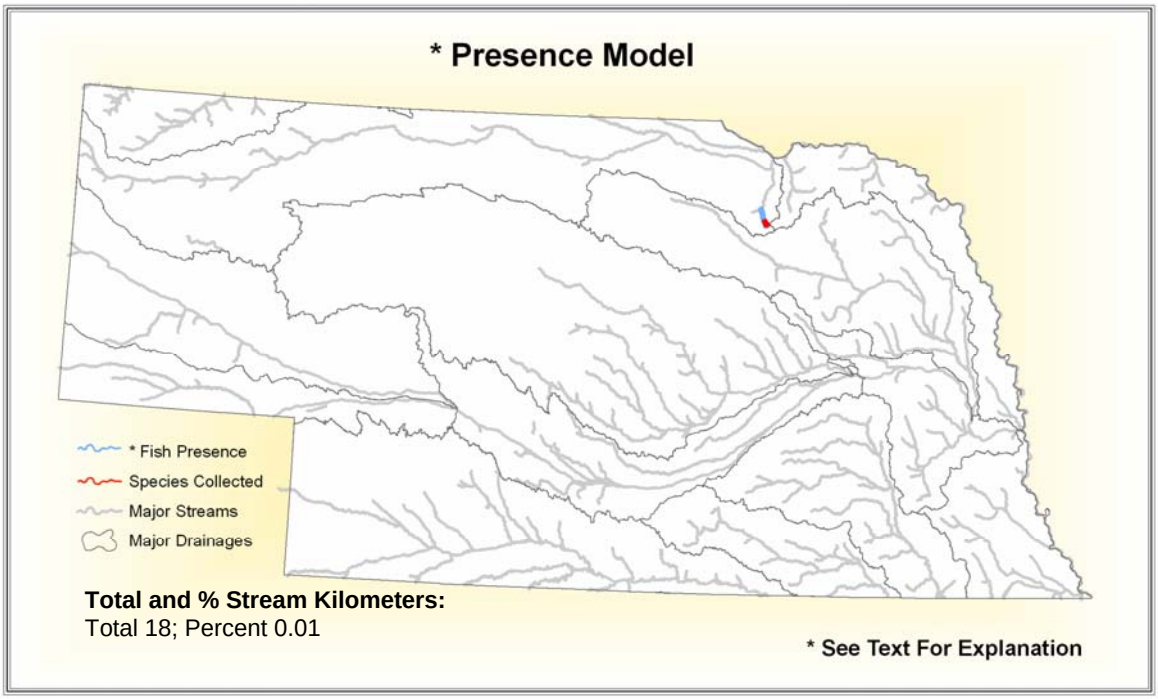
Cutthroat Trout

Oncorhynchus Clarki

Native: No
State Rank: S?
Global Rank: G4

ITIS Code: 161983
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Cutthroat trout is known only from the East Branch of Verdigree Creek in Nebraska.

Habitat Affinities:

Cutthroat trout require very clear and pollution free waters in order to survive. If cutthroat trout are present it usually means that the streams are in very good condition with cold well oxygenated water. The species is most likely to be found in streams with gravel bottoms that provide good spawning conditions. Some of the species can also be found in various lakes that have very cold water. They generally eat smaller insects but are known to eat various other creatures as well (Tomelleri and Eberle 1988).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 0%
Overall: 100%

References:

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Jacob Smith Director

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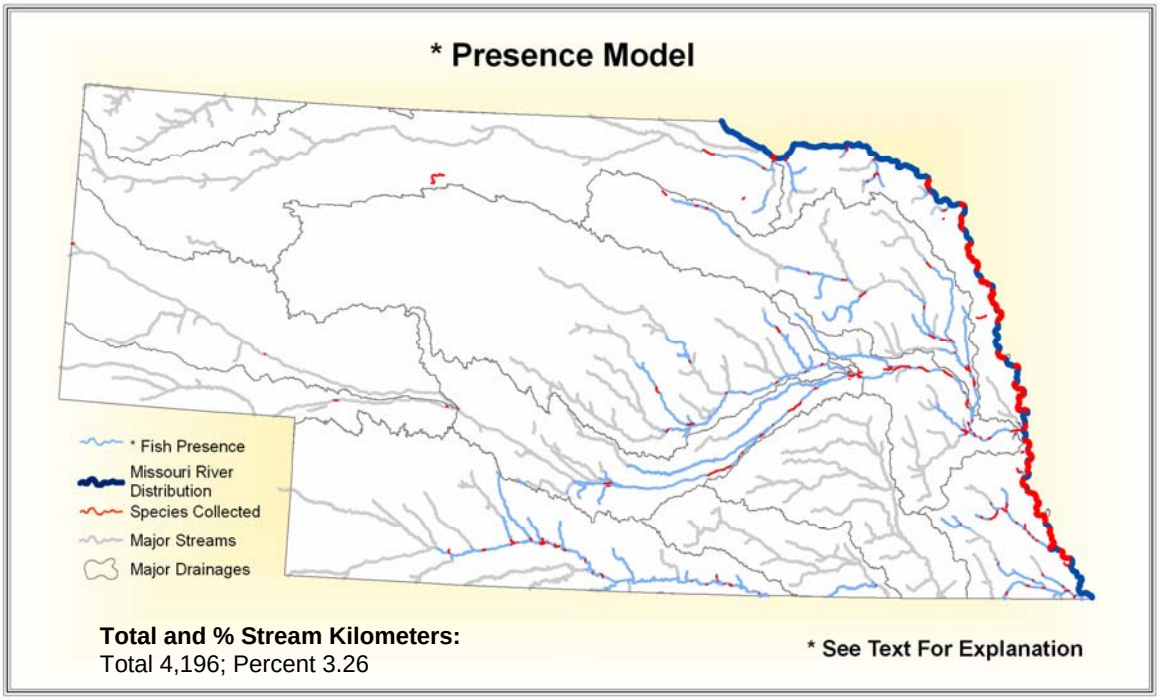
Emerald Shiner

Notropis atherinoides

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163412
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The emerald shiner can be found in somewhat scattered populations in eastern Nebraska. Although primarily found in the main stems of the Missouri and Platte Rivers, the emerald shiner is also present in the Republican, Nemaha, Elkhorn, and Niobrara drainages as well as many Missouri River tributaries.

Habitat Affinities:
The emerald shiner occurs in a variety of habitats, as it is tolerant of a wide range of turbidities, bottom types, and current velocities (Pflieger 1997). This shiner is characteristic of large, open channels of medium to large-sized, clear rivers and streams with sandy substrates (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is often found in the middle or uppers layers of water over firm bottoms (Clay 1975) and noticeable current (Pflieger 1997). It also inhabits reservoirs in some parts of its range but has not been found in any Missouri reservoirs yet (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 1%
Commission: 11%
Overall: 88%

References:

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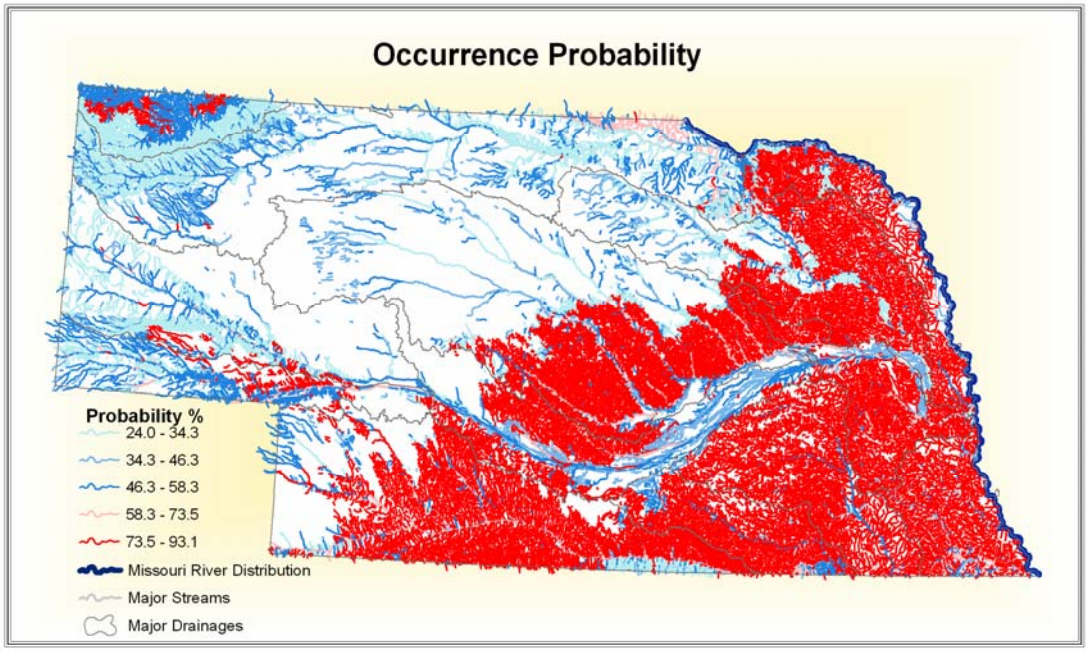
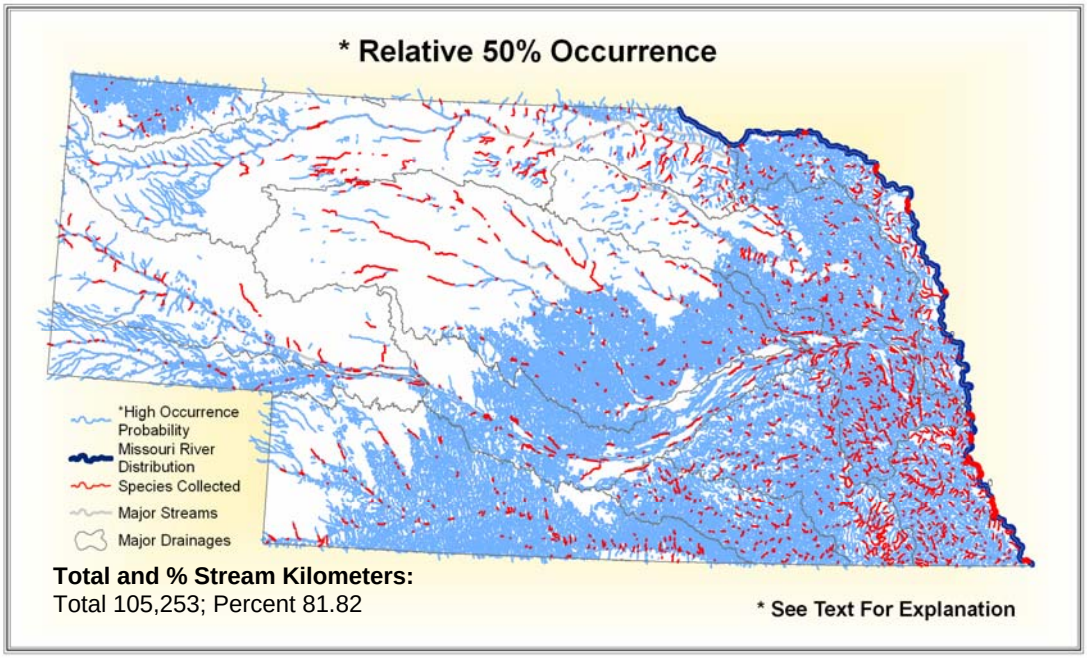
Fathead Minnow

Pimephales promelas

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163517
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The fathead minnow can be found across the entire state of Nebraska including the Missouri River. The largest concentrations of the species occur in the southeastern portion of the state.

Habitat Affinities:
The fathead minnow can be found in streams of various sizes but is only abundant in sluggish, intermittent streams, ditches and ponds with soft, silty mud or firm clay substrates (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). It is intolerant of competition and predation but uniquely adapted to stagnant pools, acid bog-ponds, and alkaline streams where extremes in pH, low oxygen levels, high turbidity, and high temperatures decrease fish diversity (Pflieger 1971; Trautman 1957). In the Central Plains Aquatic Subregion it is found along floodplains in shallow, silty sloughs. During extended dry periods it seeks refuge in stagnant pools of small Plains streams (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 7%
Commission: 20%
Overall: 73%

References:

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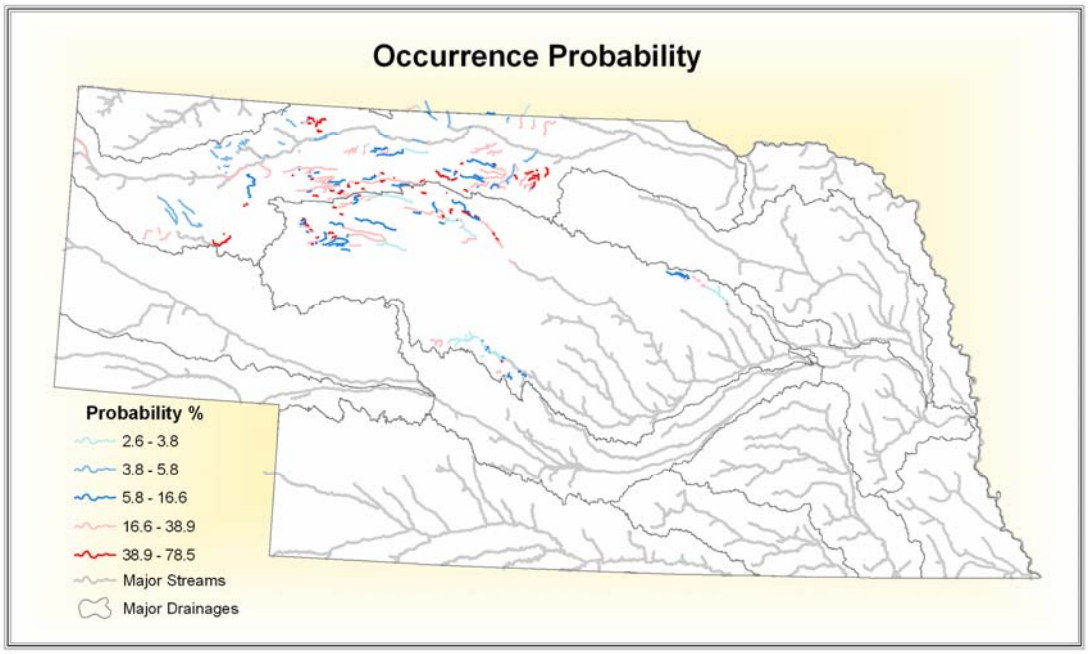
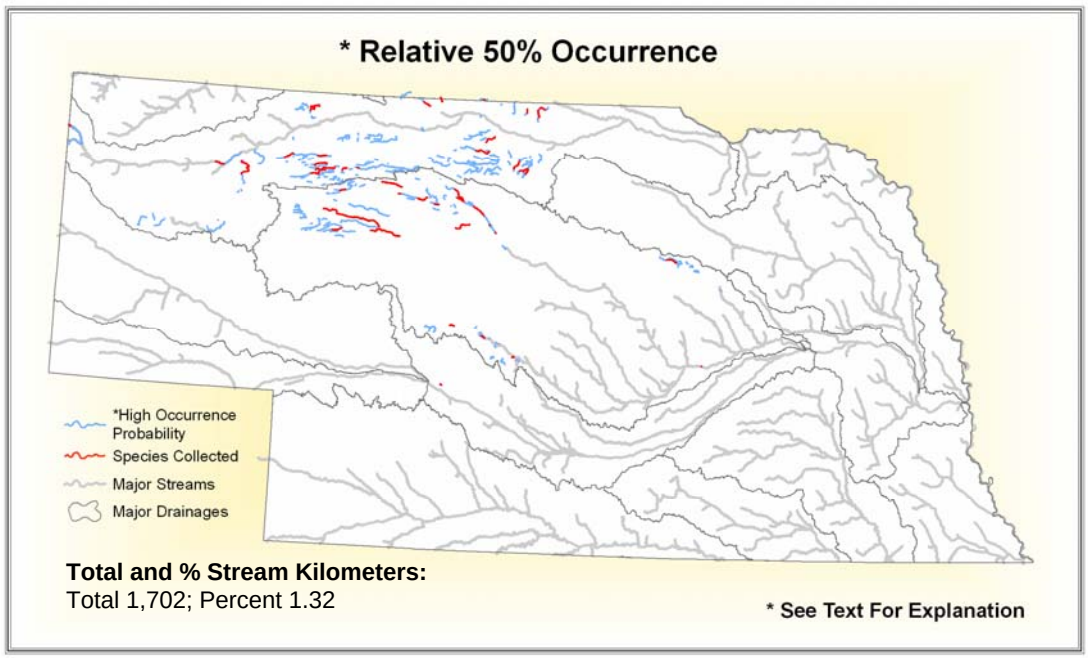
Finescale Dace

Phoxinus Neogaeus

Native: Yes
State Rank: S2
Global Rank: G5

ITIS Code: 163594
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The finescale dace can be found scattered across northwest Nebraska including much of the Sand Hills. The range includes central portions of the Niobrara drainage and the upper Loup River along with respective tributaries.

Habitat Affinities:

The finescale dace generally inhabit the same waters as the northern redbelly dace and they will generally interbreed. They can generally be found around beaver ponds, but also prefer cool creeks, lakes and can some times be found in cool bogs (Tomelleri and Eberle 1988). The species can also usually be found near vegetation and spawn near debris or cover (Page and Burr 1991, Lee 1990). The finescale dace typically prefers creeks and smaller rivers that contain pools or backwaters and have a low gradient.

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 0%
Commission: 1%
Overall: 98%

References:

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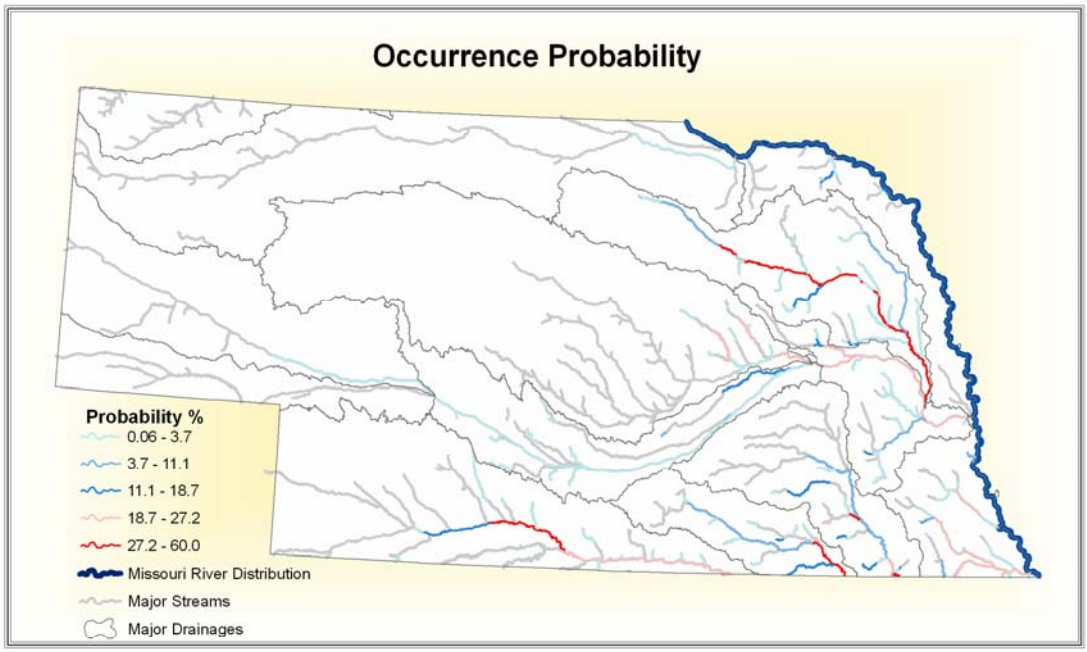
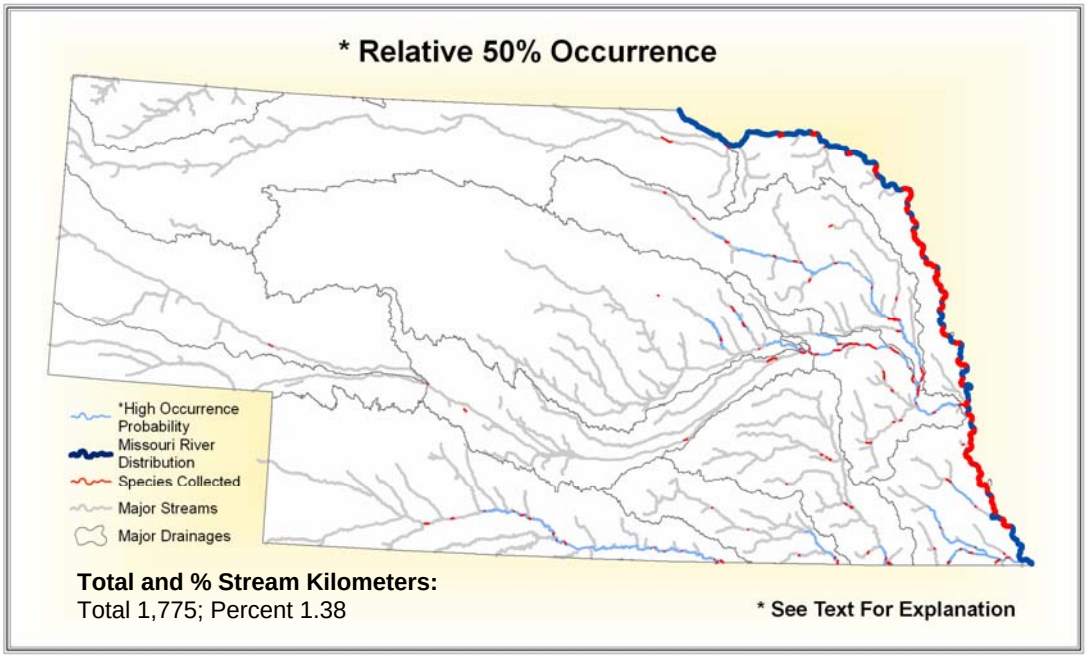
Flathead Catfish

Pylodictis olivaris

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164029
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Flathead catfish are primarily found in the large river systems like the Platte and the Missouri, but they also are present in other rivers like the Elkhorn, Loup, Republican, Big Blue, Little Blue and Nemaha. More generally, their range consists of the mainstems of larger rivers in the eastern portion of Nebraska.

Habitat Affinities:

The flathead catfish inhabits a wide variety of habitats and can tolerate extreme turbidity (Robinson and Buchanan 1988; Trautman 1957) but avoids headwater creeks and high-gradient streams (Pflieger 1997). During the daylight hours it is typically found adjacent to deep pools created by strong current in large sluggish rivers (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Trautman 1957), or low gradient tributaries of large streams (Eddy and Underhill 1974; Etnier and Starnes 1993). The flathead catfish also inhabits reservoirs (Robinson and Buchanan 1988; Etnier and Starnes 1993), but is more plentiful below dams of major impoundments (Eddy and Underhill 1974; Douglas 1974). It is usually found about drift piles, submerged logs or fallen trees with hard-bottomed substrates of sand or silt (Clay 1975; Pflieger 1997; Trautman 1957). Riffles are used by nocturnally feeding adults and are the main habitat of young, which also stay in pools, backwaters and sheltered places as they mature (Clay 1975; Pflieger 1997; Phillips et. al. 1982; Trautman 1957).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 4%
Overall: 95%

References:

Barnickol, P. G. and W. C. Starrett. 1951. Commercial and sport fishes of the Mississippi River between Caruthersville, Missouri, and Dubuque, Iowa. Bulletin of the Illinois Natural History Survey 25(5):267-350.

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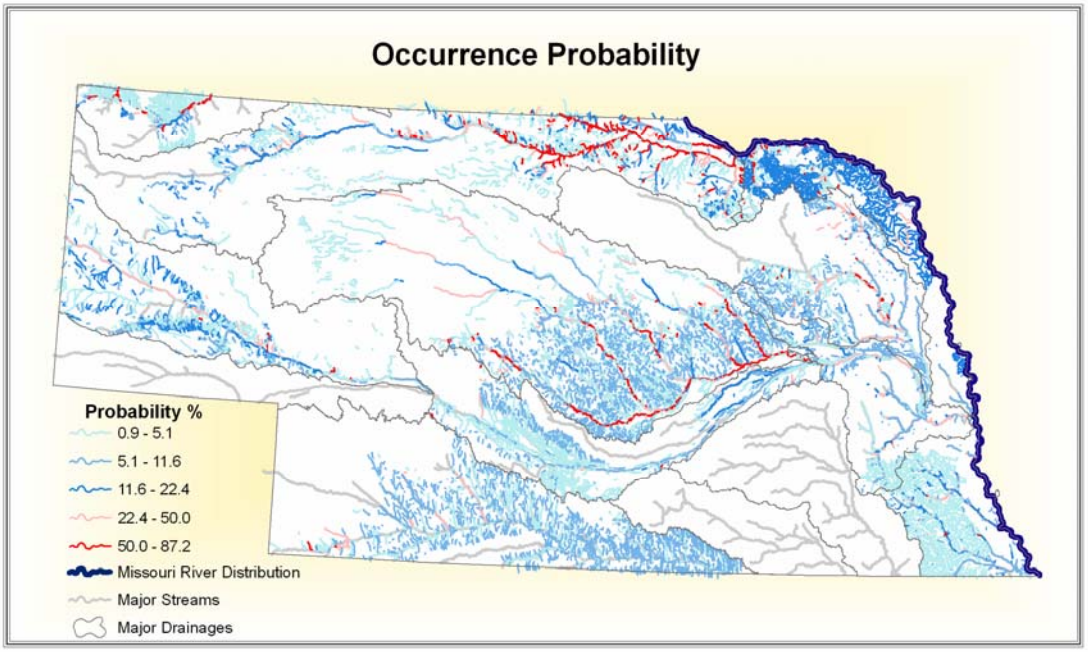
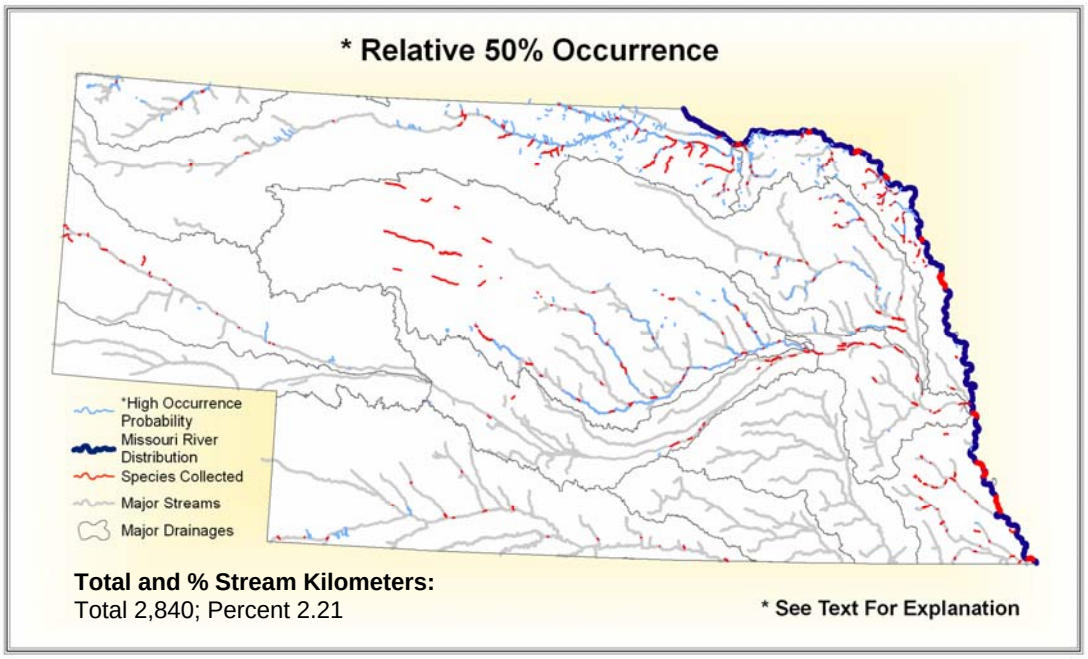
Flathead Chub

Platygobio gracilis

Native: Yes
State Rank: S1
Global Rank: G5

ITIS Code: 163882
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The flathead chub is found across most of the state of Nebraska although is notably absent from the South Platte, Big Blue and Little Blue drainages.

Habitat Affinities:
The flathead chub is typically found in the main channel of turbid, flowing streams and rivers with firm sand or gravel substrates (Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997). It is found in moderately clear, small creeks with slack current and gravel and bedrock substrates (Pflieger 1997). Cross and Collins (1975) typically found the flathead chub in shallow pools but also collected it in strong currents over sand.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 8%
Commission: 5%
Overall: 88%

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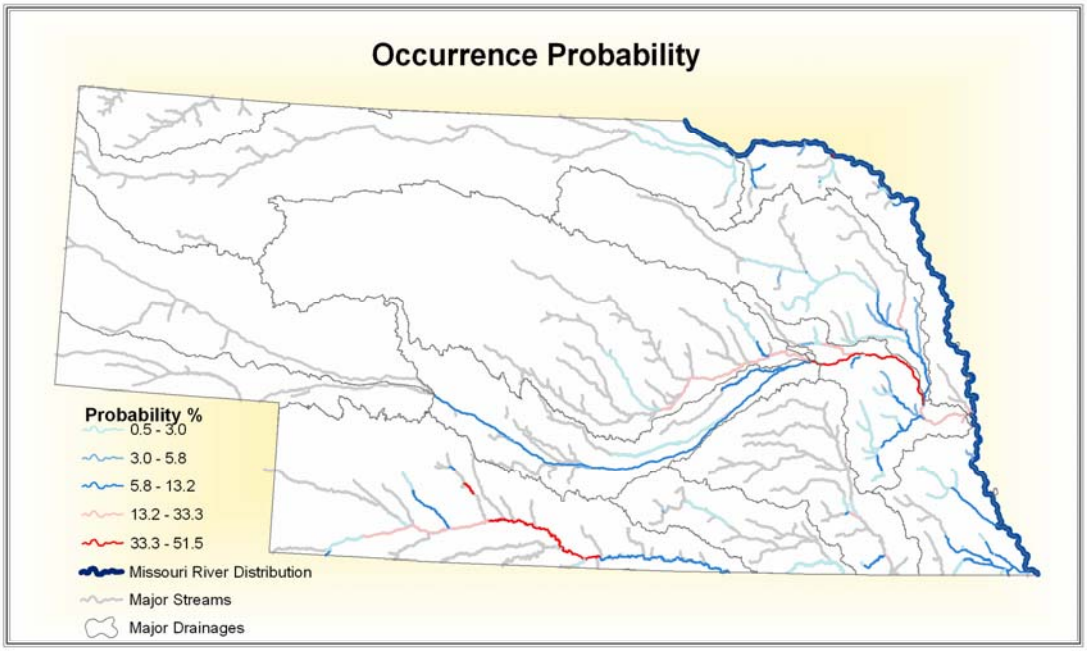
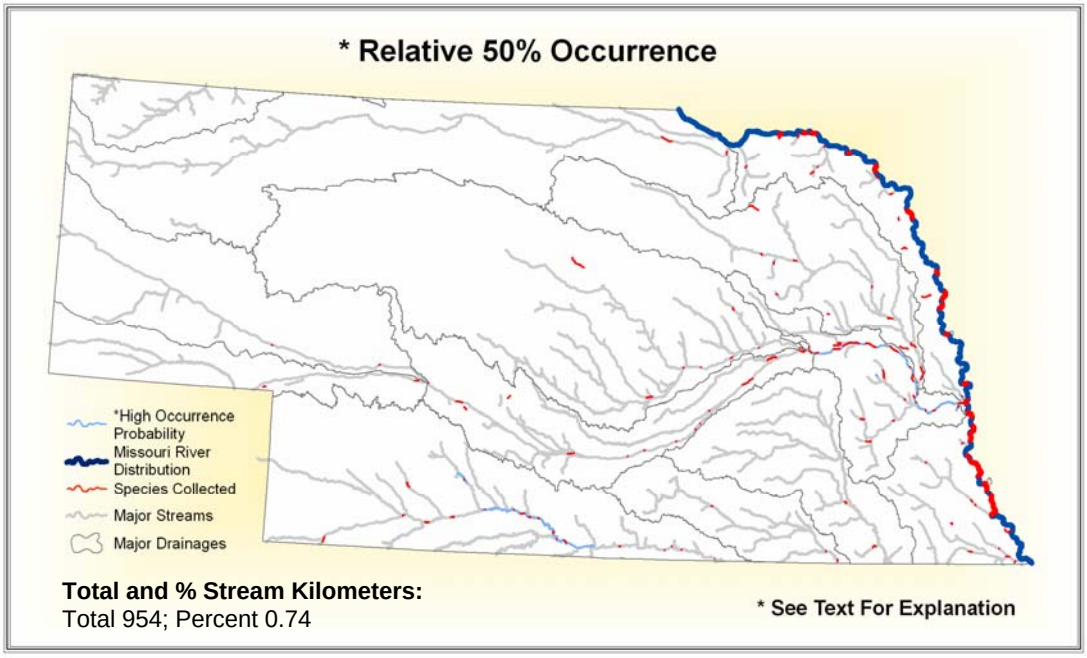
Freshwater Drum

Aplodinotus grunniens

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 169364
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The freshwater drum can be found in the large river systems of eastern and southern Nebraska, especially the Missouri and Platte Rivers. The species can also be found in the Republican River, the Elkhorn River and its tributaries, along the lower portion of the Niobrara, and in the Nemaha drainage.

Habitat Affinities:
The freshwater drum is usually found in shallow or muddy areas of large lakes (Douglas 1974; Eddy and Underhill 1974), deep backwater pools of large rivers (Etnier and Starnes 1993; Robinson and Buchanan 1988), and in reservoirs at depths of 30 ft or more (Pflieger 1997). The freshwater drum avoids high-gradient streams (Clay 1975), but can tolerate high turbidity (Pflieger 1997; Trautman 1957). The freshwater drum feeds near the bottom and spawns in open waters (Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 3%
Commission: 3%
Overall: 94%

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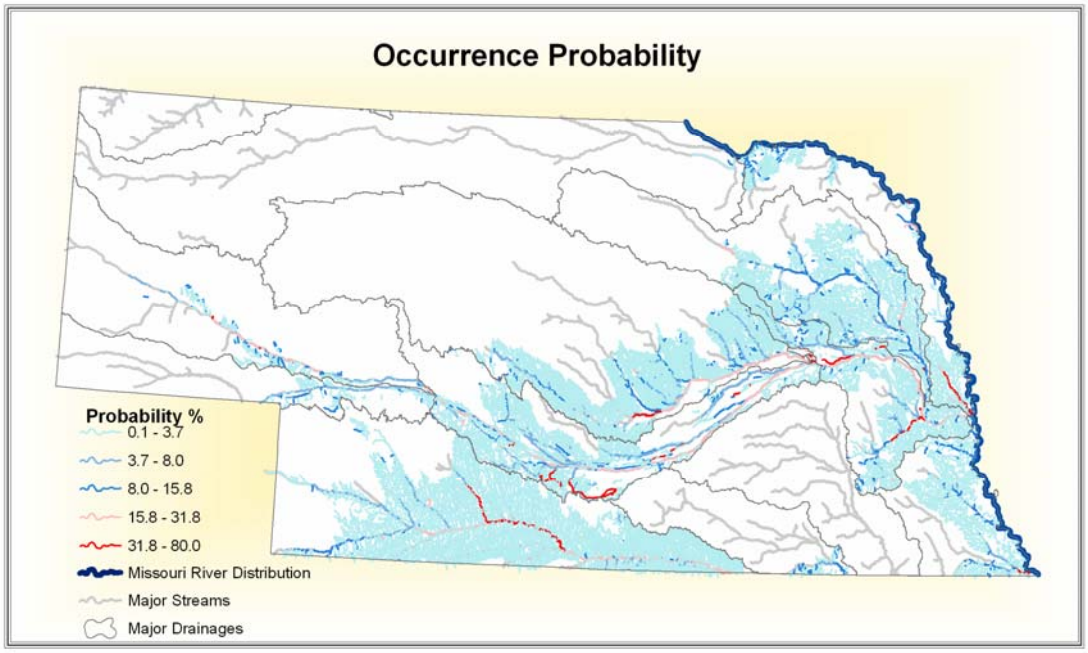
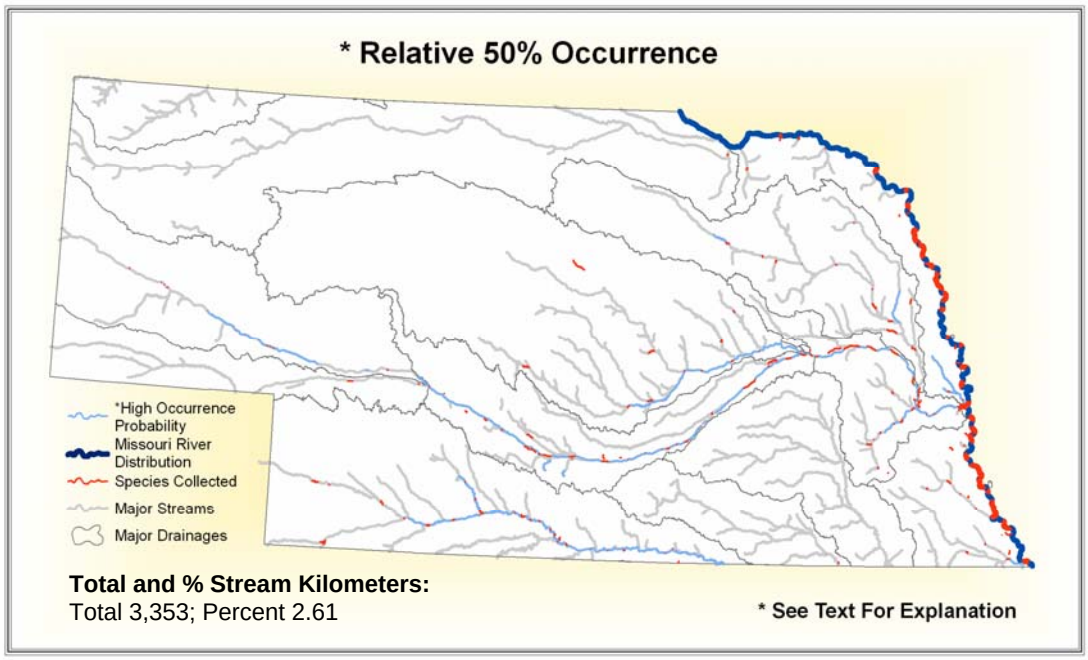
Gizzard Shad

Dorosoma cepedianum

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161737
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The gizzard shad is the most prevalent in the large river systems of Nebraska, although they can also be found in larger lakes and some smaller rivers. The main areas that they inhabit are the Missouri, Republican, Platte and lower reaches of the Elkhorn rivers. Additionally, the species can be found in parts of the Nemaha drainage and Missouri River tributaries.

Habitat Affinities:

The gizzard shad is common in lakes, oxbows, impoundments, sloughs and large rivers with basic or low gradients (Etnier and Starnes 1993; Trautman 1957), but reaches greatest abundance in waters where fertility and productivity are high (Pflieger 1997; Robinson and Buchanan 1988). It avoids high gradient streams and rivers in the mountains and rivers without large, permanent pools, but can tolerate moderately turbid and occasionally even brackish or salt waters (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It has benefited from the decreased turbidity in the Missouri River since the construction of upstream reservoirs (Pflieger 1997). The gizzard shad spawns in shallow backwaters or near the shore (Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 3%
Commission: 5%
Overall: 92%

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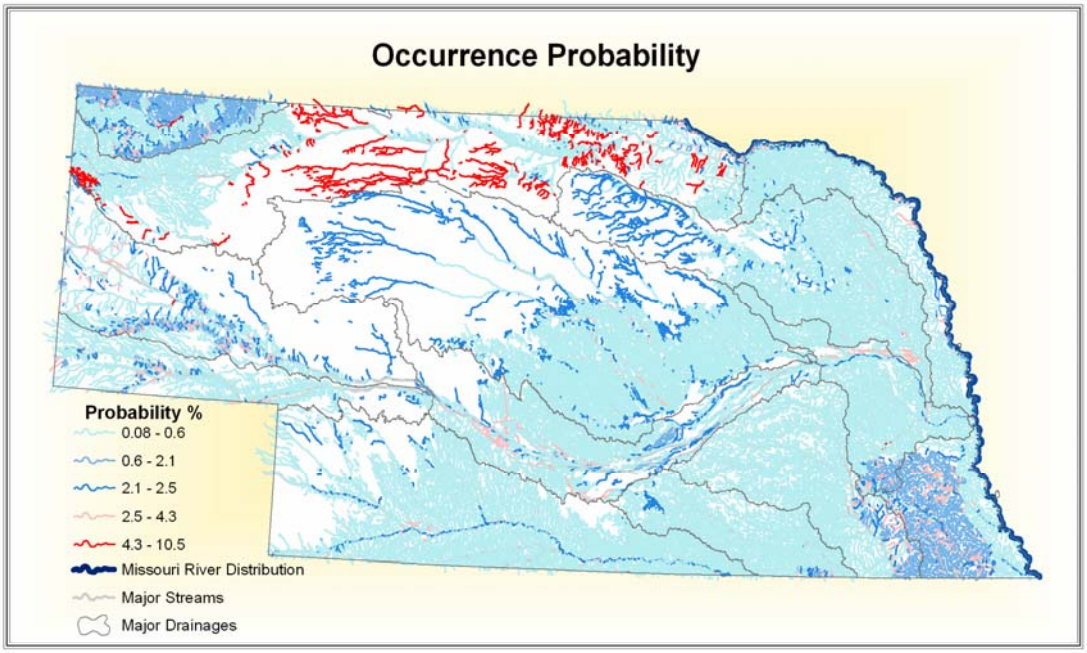
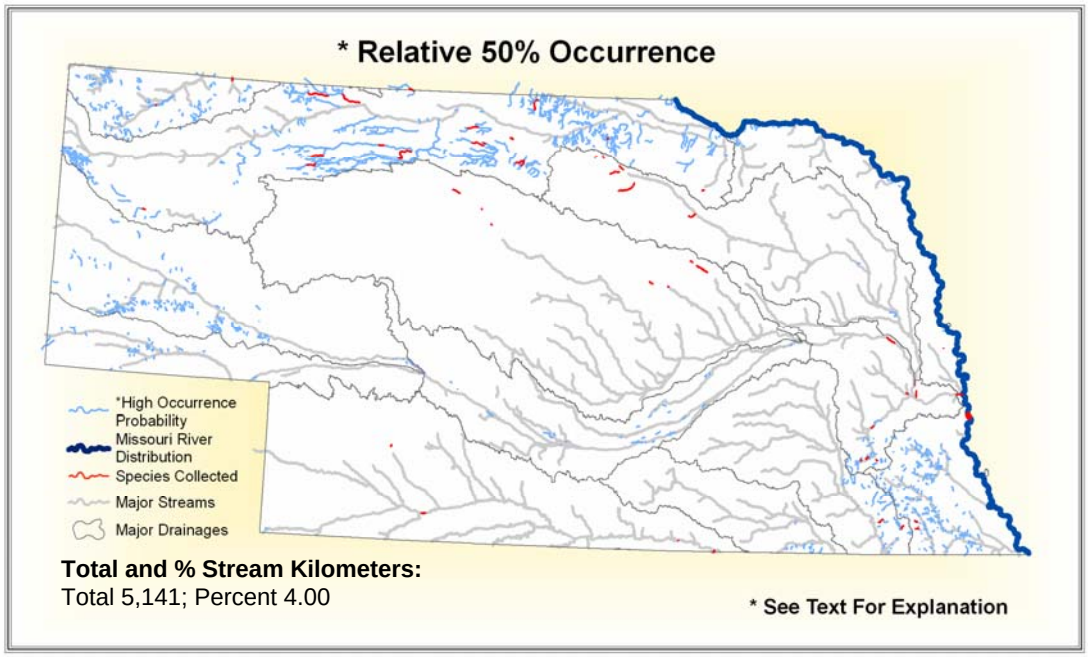
Golden Shiner

Notemigonus crysoleucas

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163368
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The golden shiner's range includes much of Nebraska, but is focused in the southeast and north central portions of the state. The species can also be found in the Missouri River.

Habitat Affinities:
The golden shiner can be found in a variety of clear, quiet water habitats but reaches greatest abundance in sloughs, ponds, reservoirs, clear lakes, canals, ditches and the quiet pools of low-gradient streams (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It thrives in areas with dense growths of aquatic vegetation and bottoms composed mainly of organic debris or sand (Trautman 1957). The golden shiner is more tolerant of low oxygen levels, nutrient enrichment, turbidity and pollution than other minnows (Phillips et. al. 1982; Robinson and Buchanan 1988), but Trautman (1957) has recorded decreases in abundance as drainage, turbidity, siltation and pollution have increased in Ohio.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 8%
Overall: 91%

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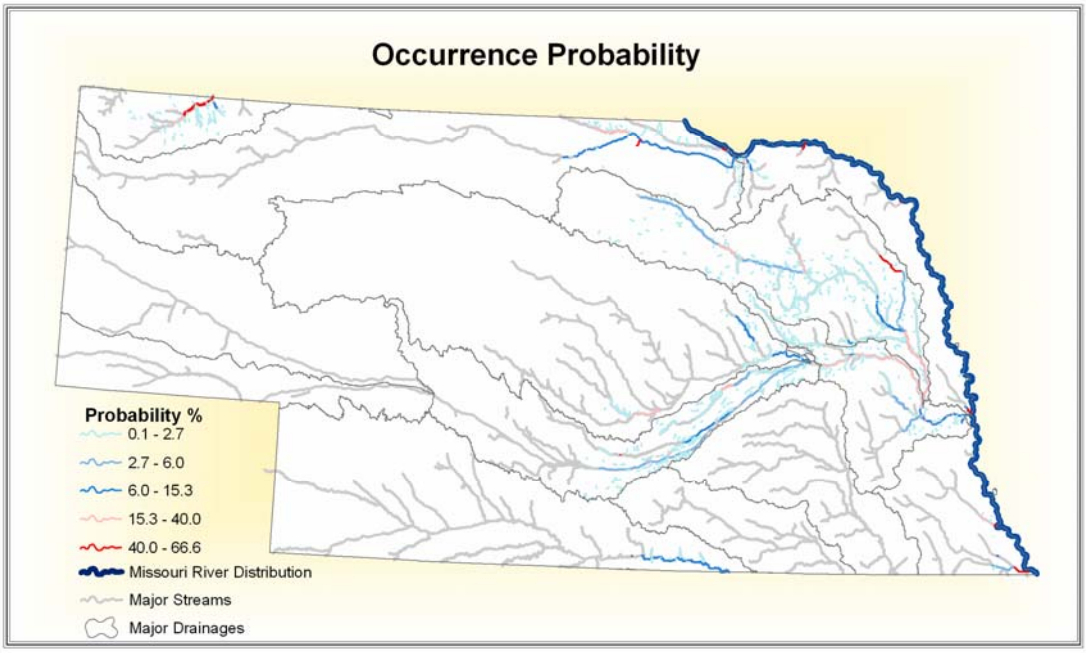
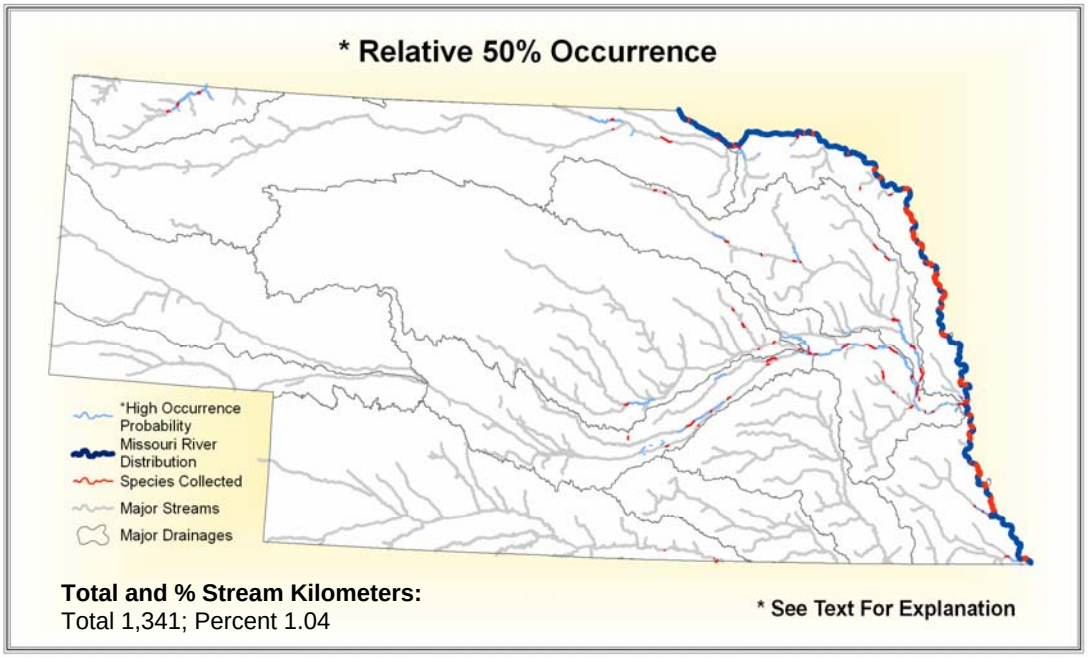
Goldeye

Hiodon alosoides

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161905
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,341; Percent 1.04

State Range:

The goldeye is most commonly found in the larger river systems of the state of Nebraska, but can be found in various other places across the state. The principal rivers of its range are the Missouri, Elkhorn, and the lower reaches of the Platte and Niobrara Rivers. The species can also be found in the White River in northwest Nebraska and along a portion of the Republican River in south-central Nebraska.

Habitat Affinities:

The goldeye is most common in the muddy, open waters of medium to large-sized rivers with low gradient and firm sand substrates (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). The goldeye is more tolerant of turbidity than the mooneye (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988) but avoids turbidity caused by industrial pollutants, as opposed to clay suspension (Trautman 1957). The habitat of the goldeye has been reduced by impoundment (Etnier and Starnes 1993) but it is often found hunting smaller fishes in the swift waters below dams (Trautman 1957). The goldeye is primarily nocturnal and seeks gravelly, shallow shoal areas in flowing water or lakes to spawn (Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 3%
Overall: 96%

References:

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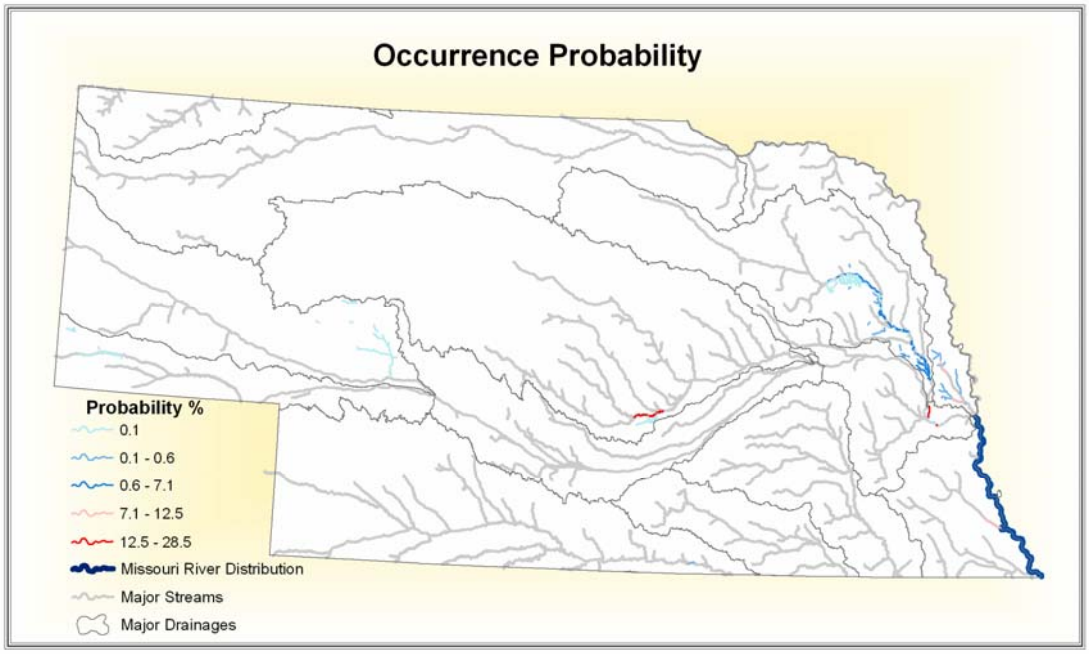
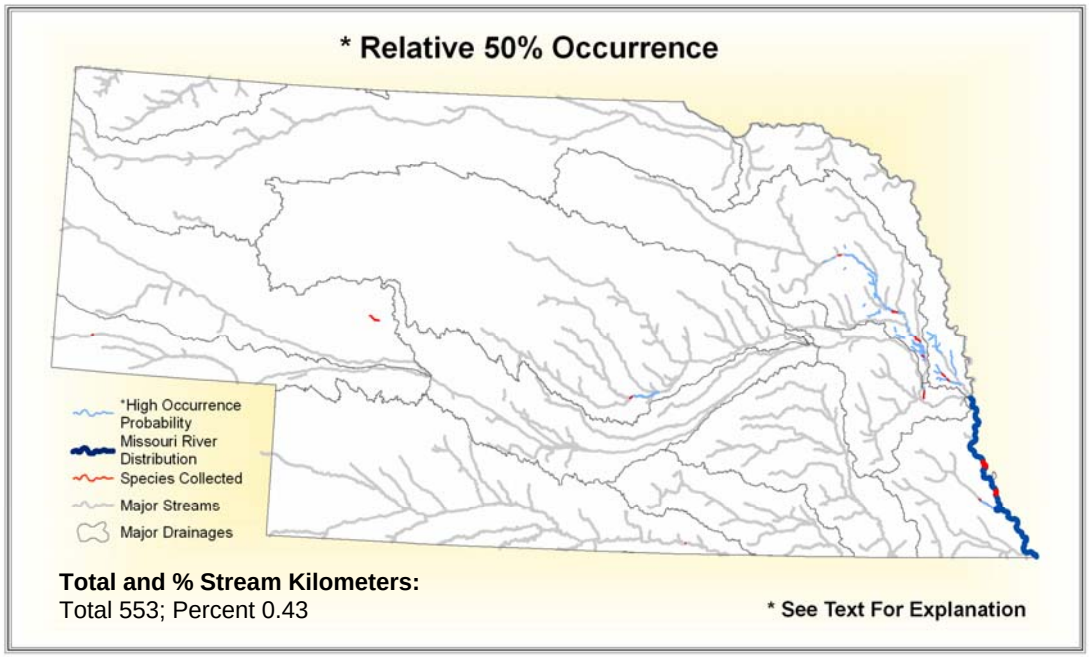
Goldfish

Carassius auratus

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 163350
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The goldfish can be found in several locations across the state of Nebraska. Most of these populations are in the Missouri River south of the Platte River and along the lower Elkhorn and Platte Rivers. There are other populations isolated across the state; the first two are located along the North and South Platte Rivers in the western portion of the state. The third is located along the South Loup River in the central portion of the state.

Habitat Affinities:
Self-sustaining populations of goldfish can be found in natural standing water habitats along streams and below hatcheries where large populations are maintained by escape. They can also be found in large impoundments where they are often used as bait (Pflieger 1997). Robinson and Buchanan (1988) found the most successful populations in small pools with dense vegetation.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 98%

References:

Becker, G. C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

Clay, W. M. 1975. The fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. 416 pp.

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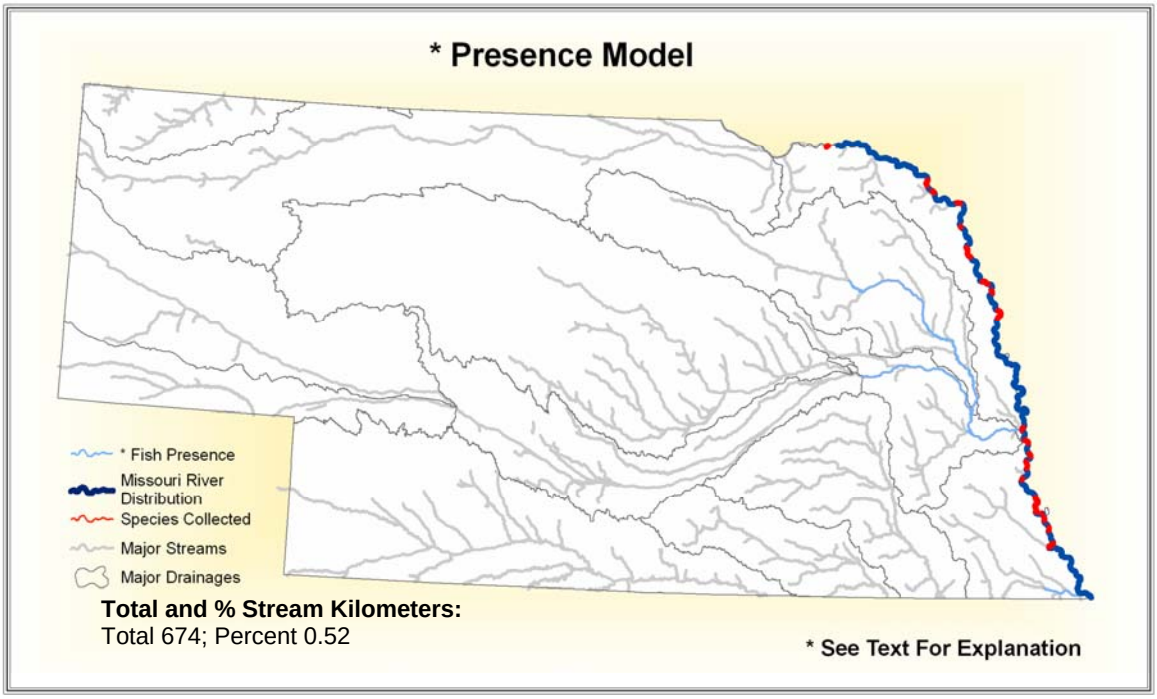
Grass Carp

Ctenopharyngodon idella

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 163537
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The grass carp is located almost exclusively in the eastern portion of the state of Nebraska. The species can be found in the large river systems of this area including the entire Nemaha and Lower Platte, as well as the lower section of the Elkhorn . In the Missouri River it is only found south of Gavin's Point Dam and the direct tributaries to the Missouri River.

Habitat Affinities:
The grass carp is most often found in large rivers but is stocked in impoundments, rice fields, ponds and lakes (Robinson and Buchanan 1988). It prefers swift, warm waters (Phillips et. al. 1982) with slack current and aquatic vegetation.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

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Bain, M. B., D. H. Webb, M. D. Tangedal and L .N. Mangum. 1990. Movements and habitat use by grass carp in a large mainstream reservoir. Transactions of the American Fisheries Society 119:553-561.

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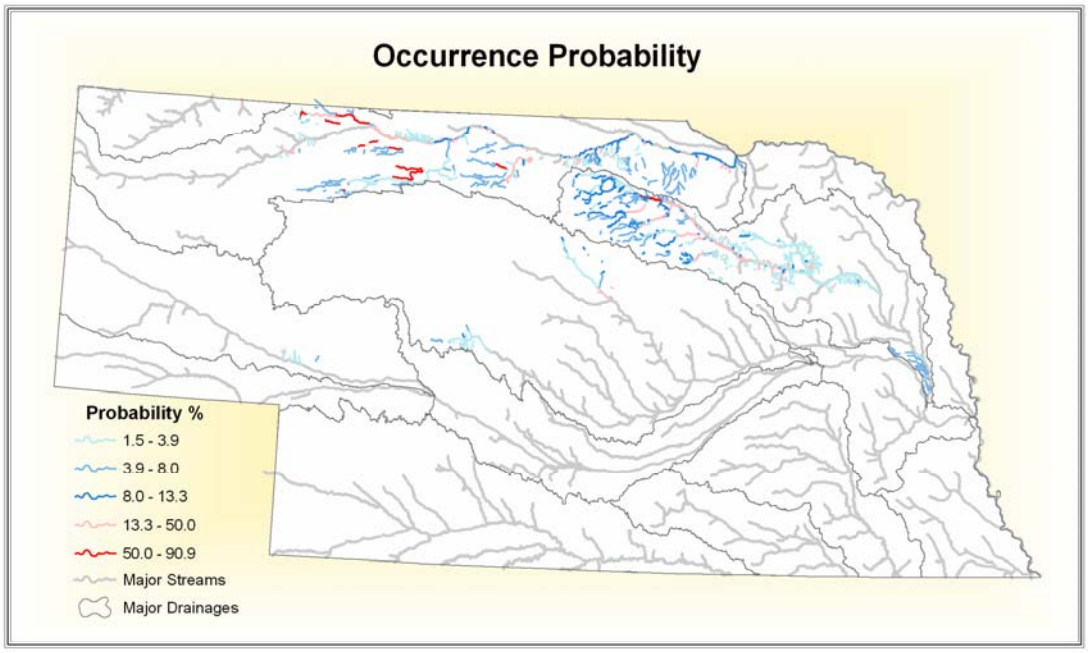
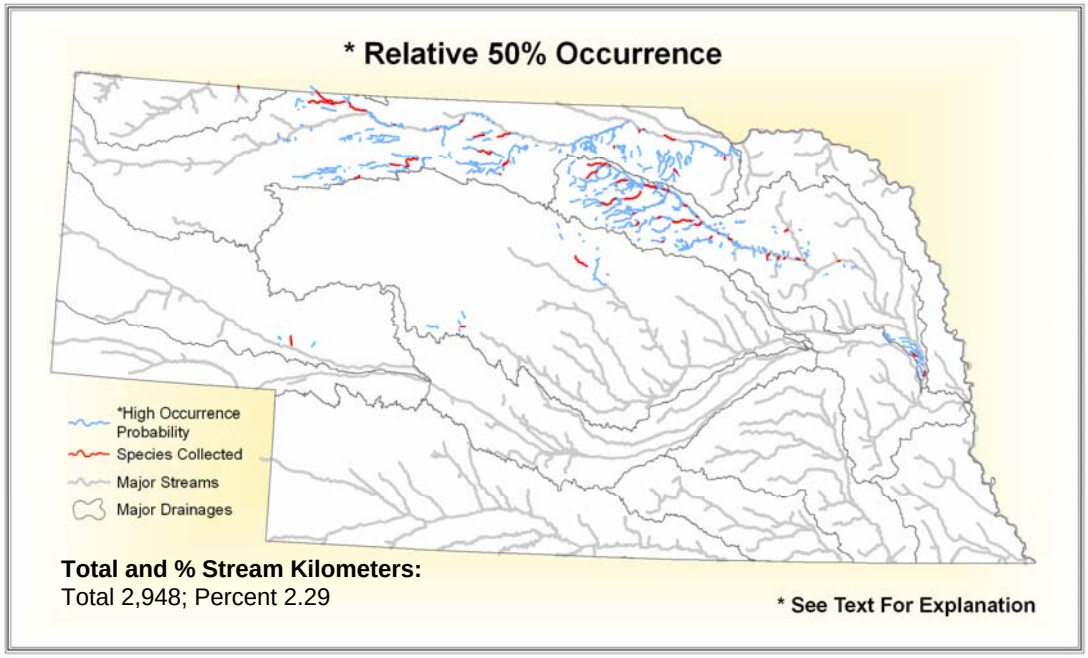
Grass Pickerel

Esox americanus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 162140
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The grass pickerel is located mainly north of the Platte River in Nebraska. The species is more prevalent in the northern portion of the state but can be found in central Nebraska. The grass pickerel is most widespread along the Niobrara River and the northern reaches of the Elkhorn River. Other more isolated populations occur in portions of the North Platte and South Loup drainages.

Habitat Affinities:
The grass pickerel occurs from natural lakes, sloughs, swamps and the sluggish parts of ditches, to creeks draining undissected uplands, protected inlets, and overflow waters of larger streams. (Pflieger 1997). It inhabits clear waters with low gradient and little current, most often around thick vegetation (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Douglas 1974). The grass pickerel population decreases when turbidity or ditching reduces aquatic vegetation and clear water (Pflieger 1997), and may increase in range with the spread of aquatic vegetation (Etnier and Starnes 1993).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 97%

References:

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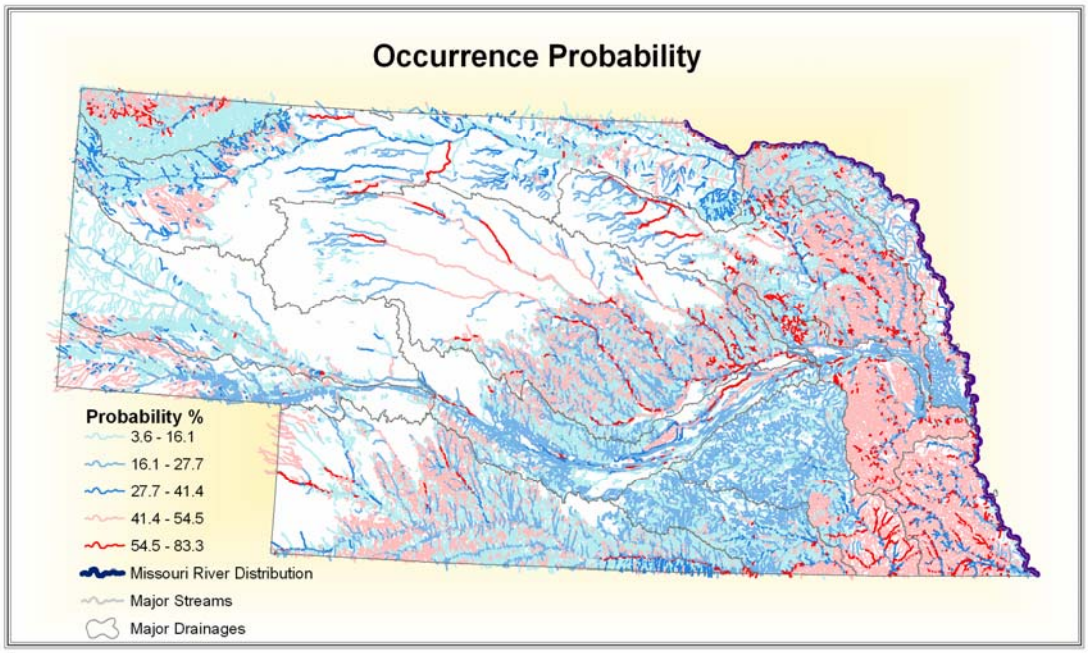
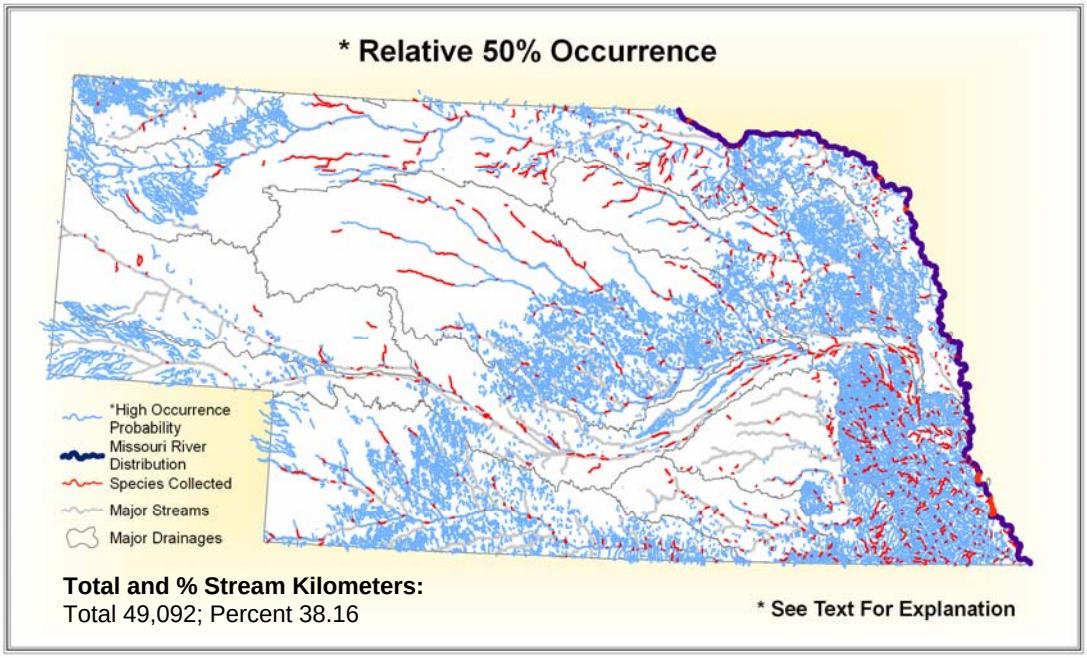
Green Sunfish

Lepomis cyanellus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168132
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The green sunfish is a very common fish in the state of Nebraska. It can be found in almost any water environment in the state from lakes and reservoirs to large rivers and smaller creeks (NatureServe 2006).

Habitat Affinities:

The green sunfish can be found in a wide variety of habitats ranging from small muddy creeks and weedy backwaters with temporary flow to overflow ponds, shallow lakes, impoundments and occasionally, the margins of large rivers (Cross and Collins 1975; Eddy and Underhill 1974; Phillips et. al. 1982; Trautman 1957). The green sunfish is commonly found near shore and around cover such as stems of vegetation, woody debris, or rocks (Cross and Collins 1975), and has no specific substrate preference (Robinson and Buchanan 1988; Trautman 1957). Its high tolerance for extremes in turbidity, siltation, low oxygen, temperature and flow allow it to inhabit, and reach greatest abundance, in areas that do not support other sunfishes (Clay 1975; Pflieger 1997; Robinson and Buchanan 1988). The green sunfish is well adapted for survival in small streams with intermittent flow that become stagnant pools later in the summer and fall. After droughts, it is often the first fish to repopulate Plains streams (Pflieger 1997).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 15%
Commission: 24%
Overall: 62%

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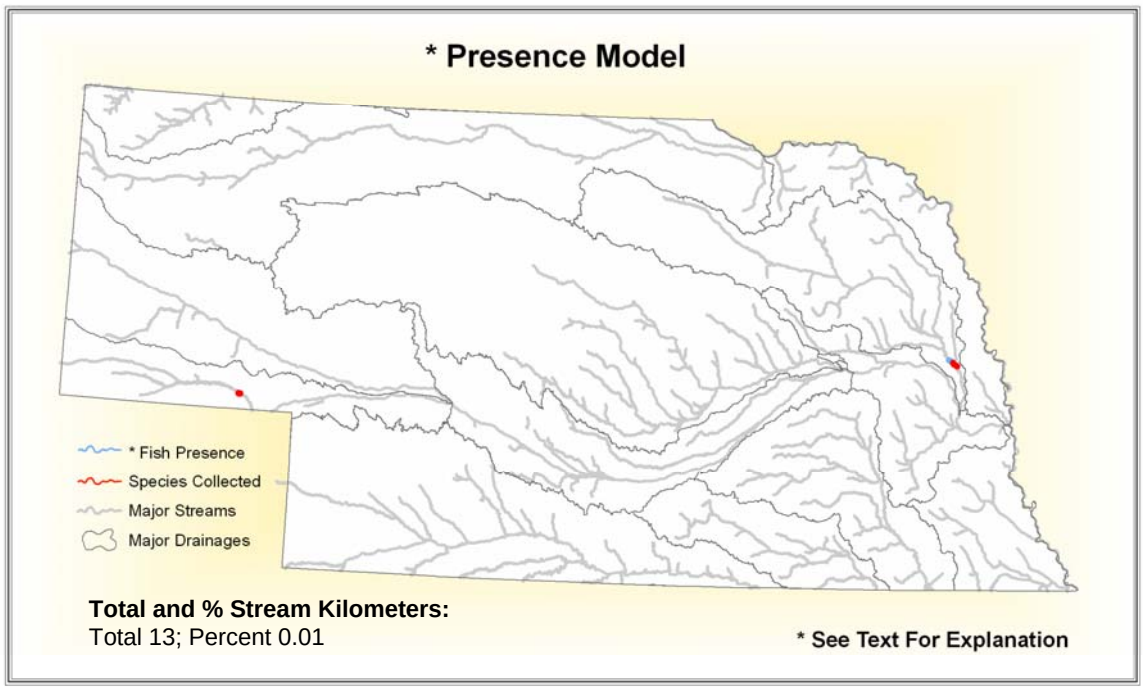
Hornyhead Chub

Nocomis biguttatus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163395
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The hornyhead chub is an uncommon species in the state of Nebraska and is only known to be in two parts of the state. The first of these populations can be found along Rawhide Creek which is located in the lower portion of the Elkhorn drainage. The second population is located along Lodgepole Creek in the South Platte drainage.

Habitat Affinities:
The hornyhead chub requires clear, cool mid-sized to large stream and river habitats with steady flow, moderate or sluggish current and substrates of clean sand or gravel (Cross and Collins 1975; Robinson and Buchanan 1988; Trautman 1957). It is often collected in small streams lined with attached algae or aquatic vegetation such as pondweed (*Potamogeton*), lizard's tail (*Saururus*), turtlehead (*Chelone*), or water-willow (*Justicia*) (Cross and Collins 1975; Trautman 1957). Hornyhead chub adults are most often found adjacent to riffles where the current is moderate (Pflieger 1997; Robinson and Buchanan 1988). Young are ecologically separated, preferring water without current and abundant water-willow lining the area (Robinson and Buchanan 1988).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 0%
Overall: 100%

References:

Aadland, L. P, C. M. Cook, M. T. Negus, H. G. Drewes and C. S. Anderson. 1991. Microhabitat preferences of selected stream fishes and community-oriented approach to instream flow assessments. Minnesota Department of Natural Resources, Section of Fisheries. 142 pp.

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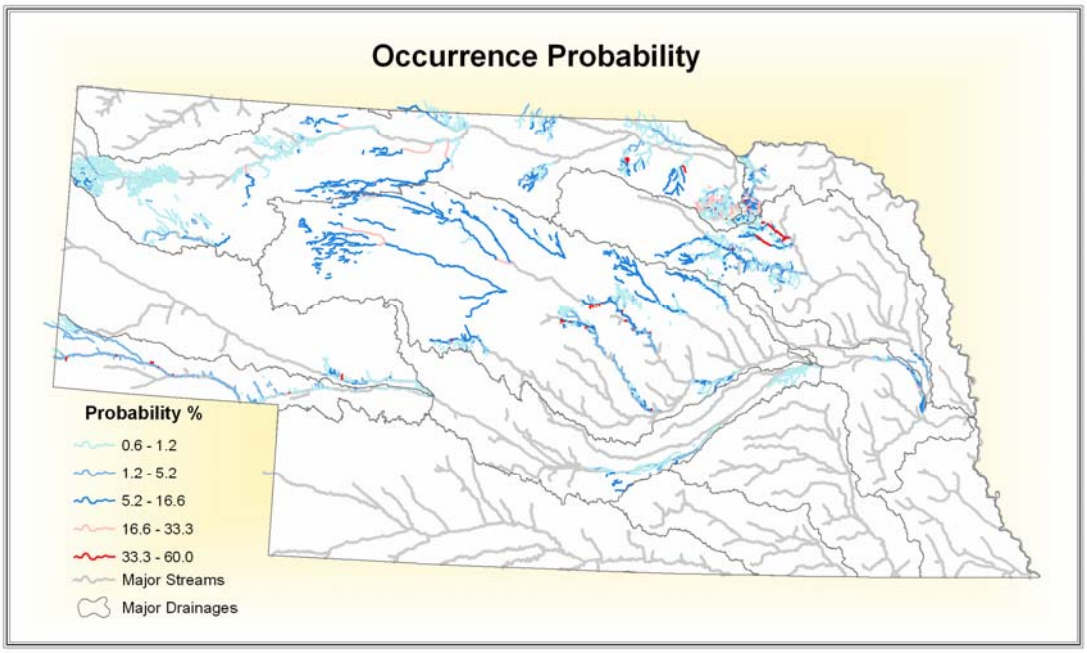
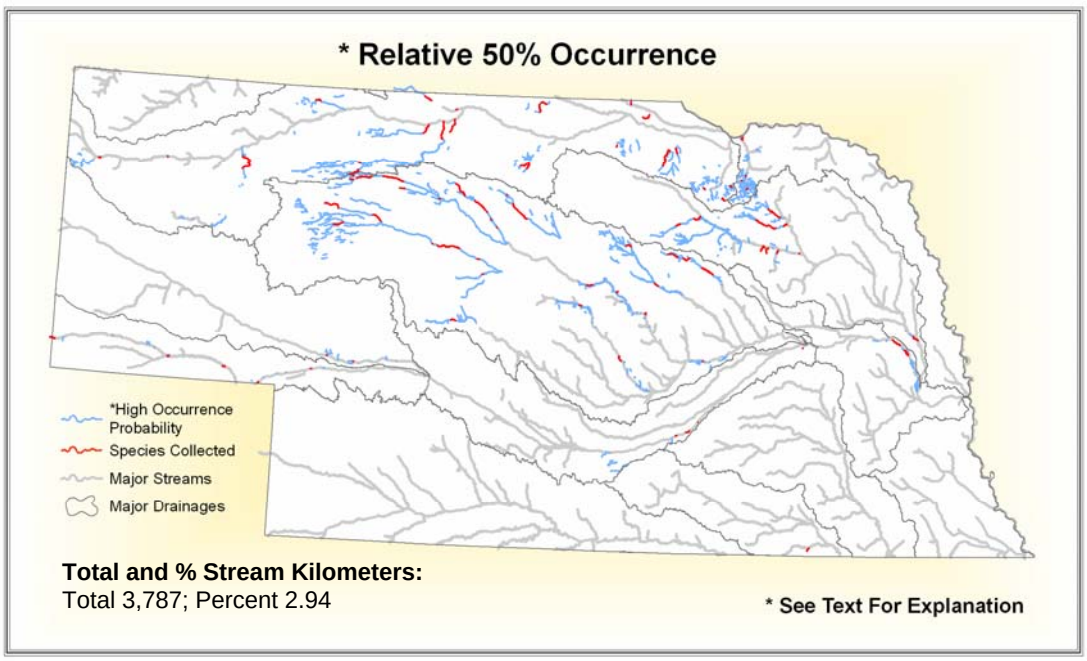
Iowa Darter

Etheostoma Exile

Native: Yes
State Rank: S4
Global Rank: G5

ITIS Code: 168393
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The Iowa darter can be found scattered throughout the state mainly north of the Platte River. Its range is focused in the Loup and the Niobrara drainages, but they are also found in the Middle Platte, North Platte, South Platte, and Elkhorn drainages.

Habitat Affinities:

Iowa darters are usually found in fairly clear flowing water. Populations in standing water are usually a result of a stream overflow or were trapped during the formation of oxbow lakes. Darters do not have air bladders so they sink to the bottom of the stream which makes them highly adapted to moving streams were the gravel bottoms break up the strong current. Darters are predators and feed on a host of creatures small enough to eat. They spawn in the spring and the Iowa darter is the least attentive to their young of all the darters. (Morris, Morris and Witt 1974) They can be found in vegetated headwaters, marshes and lakes. They sometimes are found over sand and organic material (Page 1983, Becker 1983).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 4%
Overall: 95%

References:

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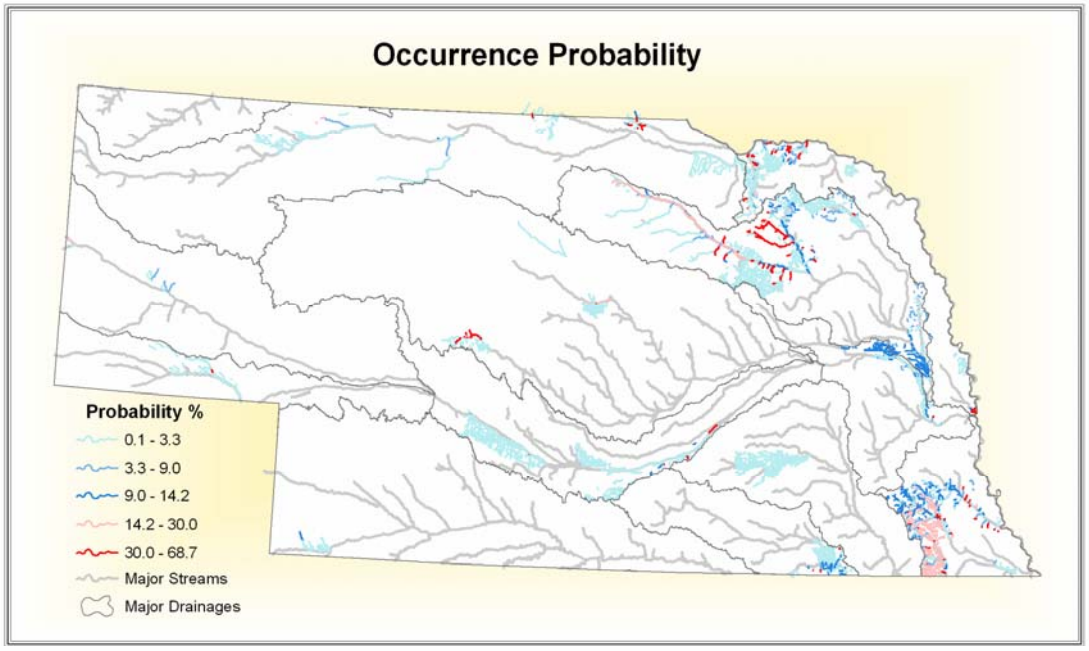
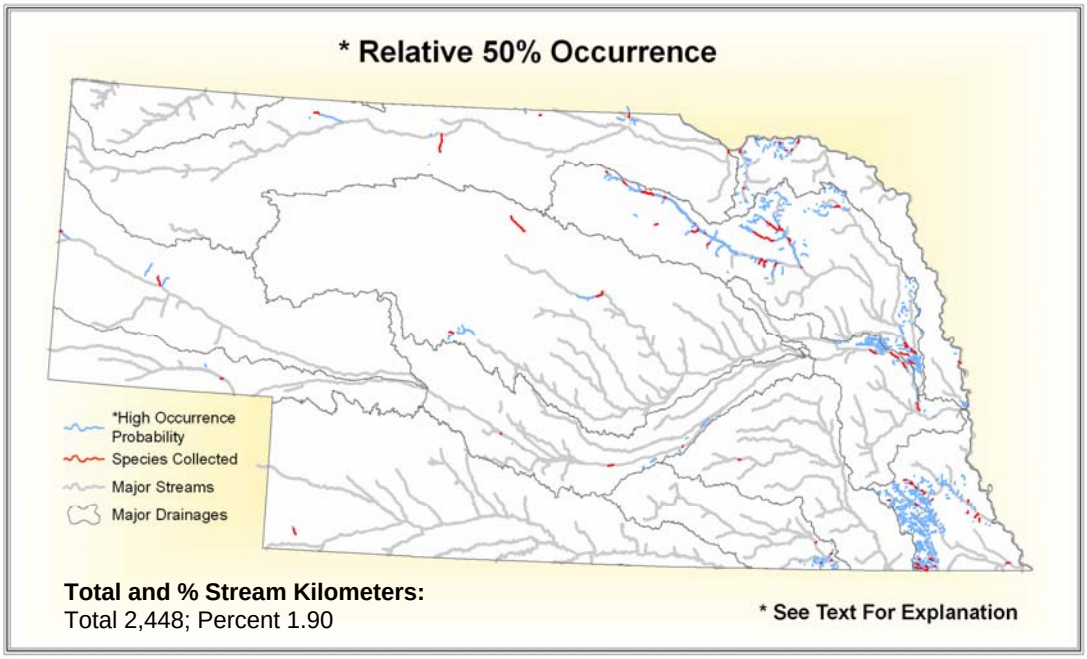
Johnny Darter

Etheostoma nigrum

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168369
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The Johnny darter is found scattered across the state of Nebraska. The species can be found patchily in every drainage except the White-Hat drainage in northwest Nebraska. The species is commonly located in smaller tributaries that drain into rivers throughout the state.

Habitat Affinities:
Unlike most darters, the johnny darter is a generalist, allowing for a wide range of habitat preferences (Phillips et. al. 1982). It is most often found in creeks and small rivers with moderate gradients and sand or sand-gravel substrates (Etnier and Starnes 1993; Trautman 1957). The johnny darter prefers the edges of shallow pools with little current (Clay 1975; Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), and is often observed perched on logs, patches of sand, small rocks or adjacent to large boulders (Phillips et. al. 1982). It is intolerant of submerged aquatic vegetation, excessive turbidity or siltation, and high gradients with continuous strong flow (Pflieger 1997; Trautman 1957). In the northern regions, the johnny darter is more widespread, inhabiting the firm shorelines of lakes and all flowing waters, including large rivers (Etnier and Starnes 1993; Phillips et. al. 1982). The johnny darter spawns in May and is known to use human refuse, such as bottles and cans, for nesting (Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 3%
Overall: 96%

References:

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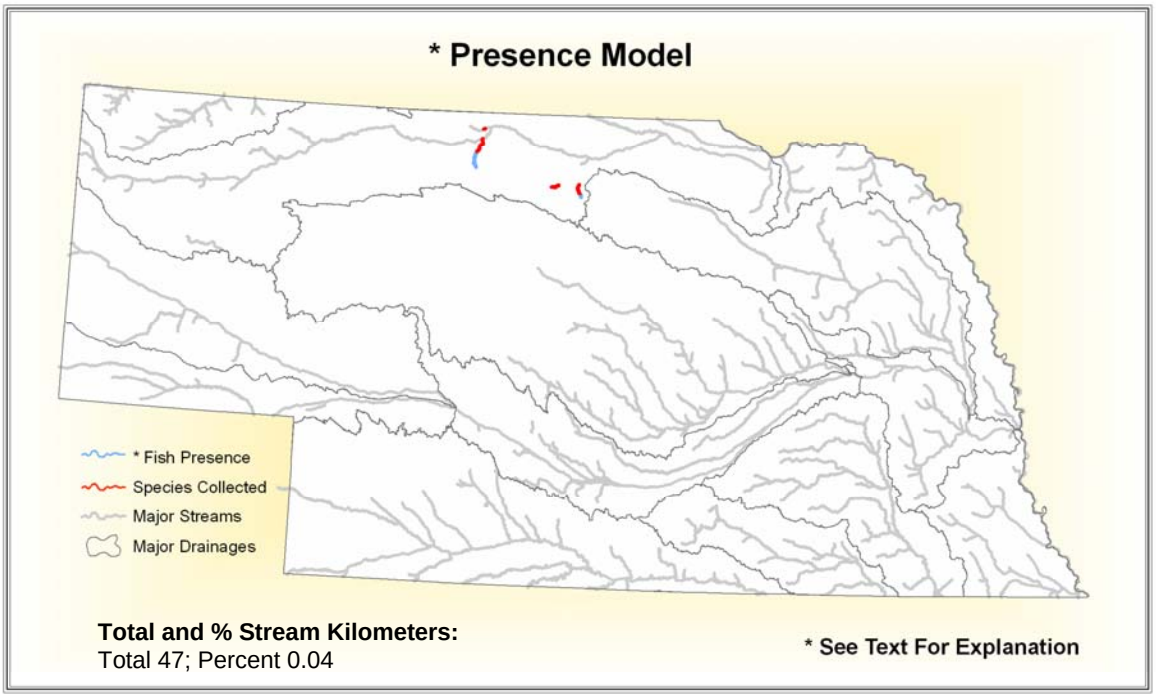
Lake Chub

Couesius Plumbeus

Native: Yes
State Rank: S1
Global Rank: G5

ITIS Code: 163535
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The lake chub is only known from a few places in the Niobrara River drainage of Nebraska and is now thought to be extirpated.

Habitat Affinities:

The lake chub can be found in several different types of habitat, they have been known to occupy various sizes of bodies of water. They most commonly are found around rocky or gravelly areas (Page and Burr 1991). In lakes they typically are found in the shallower areas but when the water warms up they will move to deeper and cooler areas. The species will spawn in the shallows of streams where they might travel up to a mile (Becker 1983).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 0%
Overall: 100%

References:

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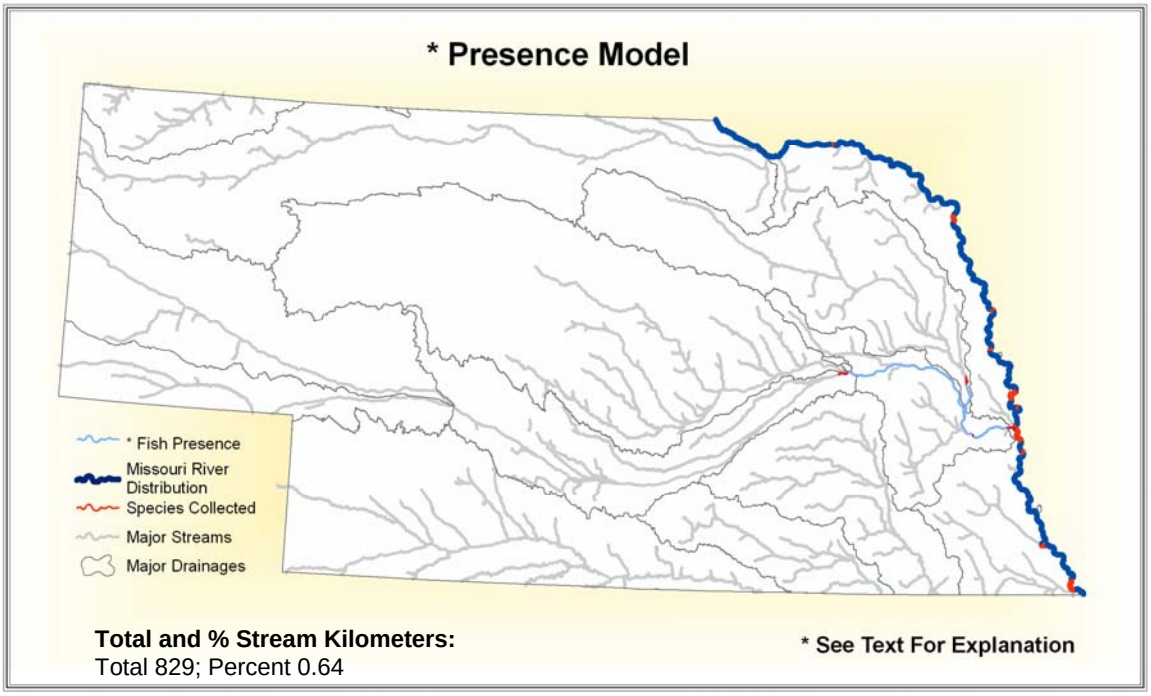
Lake Sturgeon

Acipenser fulvescens

Native: Yes
State Rank: S1
Global Rank: G3

ITIS Code: 161071
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The lake sturgeon only exists in a few waters of Nebraska including the Platte, Elkhorn and the Missouri Rivers. In the Platte River they are only known from the main stem of the lower Platte.

Habitat Affinities:
The lake sturgeon is a bottom dweller inhabiting the quiet waters of large rivers and lakes. It prefers shallow shoals in lakes and the deepest parts of large rivers (Eddy and Underhill 1974; Robinson and Buchanan 1988). In the Mississippi and Missouri Rivers, the lake sturgeon seeks firm, silt-free bottoms of sand, gravel and rock (Pflieger 1997). The lake sturgeon is known to migrate as far as 200km upstream to spawn while lake populations are non-migratory (Etnier and Starnes 1993). Populations of lake sturgeon are declining in most states from dam construction (Trautman 1957), exploitation, or pollution (Clay 1975; Etnier and Starnes 1993; Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

References:

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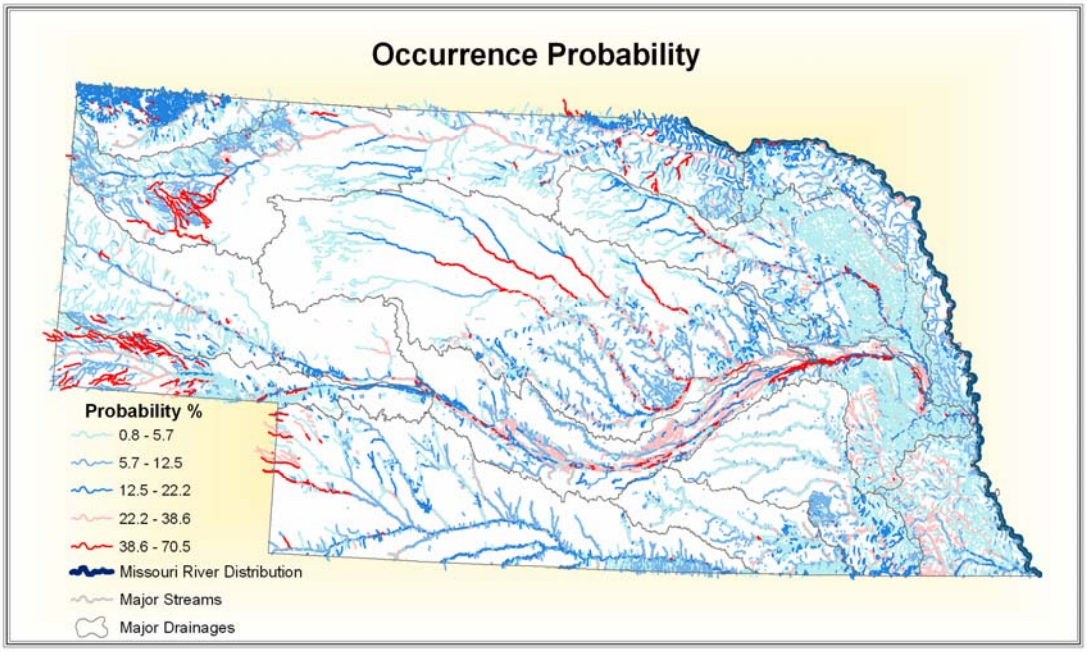
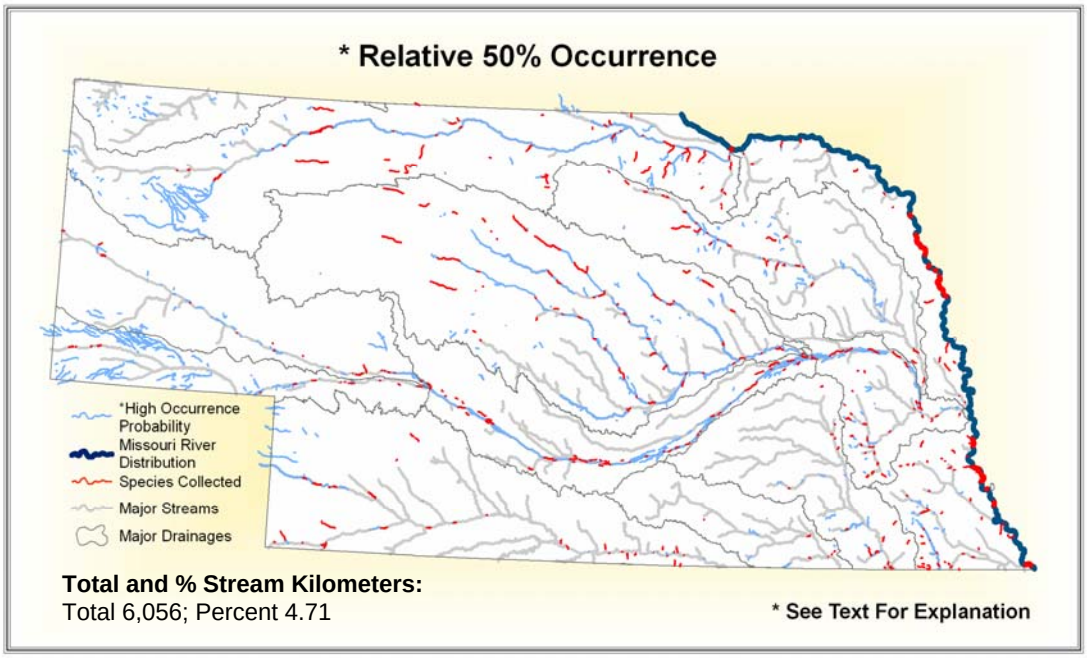
Largemouth Bass

Micropterus salmoides

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168160
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Largemouth bass are a common species in the state of Nebraska and can be found in any drainage in the state. They are often stocked in lakes and ponds.

Habitat Affinities:

The largemouth bass is found in a wide range of non-flowing, freshwater habitats from small creeks and large rivers to ponds, large lakes and impoundments (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Trautman 1957). It thrives in moderately clear, warm, lentic waters with aquatic vegetation and substrates of mud, organic debris, gravel, sand or hard, non-flocculent clays (Cross and Collins 1975; Pflieger 1997; Trautman 1957). Pflieger (1997) and Robinson and Buchanan (1988) found that the largemouth bass is intolerant of high turbidity and siltation but Etnier and Starnes (1993) report that it is more tolerant of turbidity and salinity than other basses. In the northern states, the largemouth bass is most common in small to medium-sized lakes with clear water, sandy shores and abundant aquatic vegetation (Eddy and Underhill 1974; Phillips et. al. 1982). The largemouth bass requires non-shifting gravel or pebble substrates for spawning (Cross and Collins 1975; Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 10%
Commission: 7%
Overall: 83%

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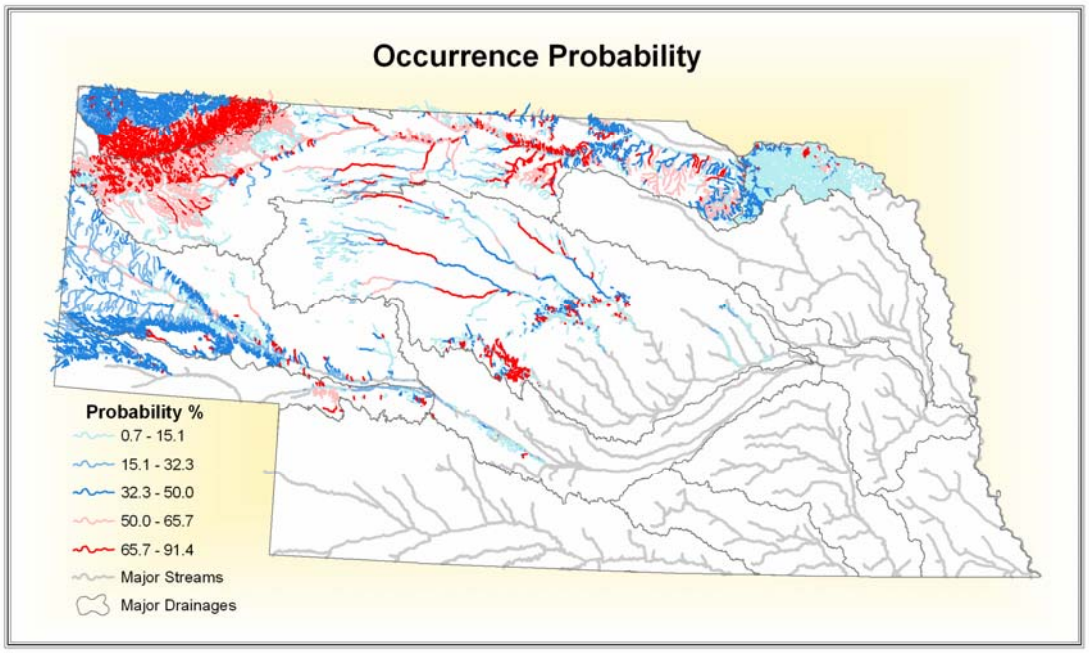
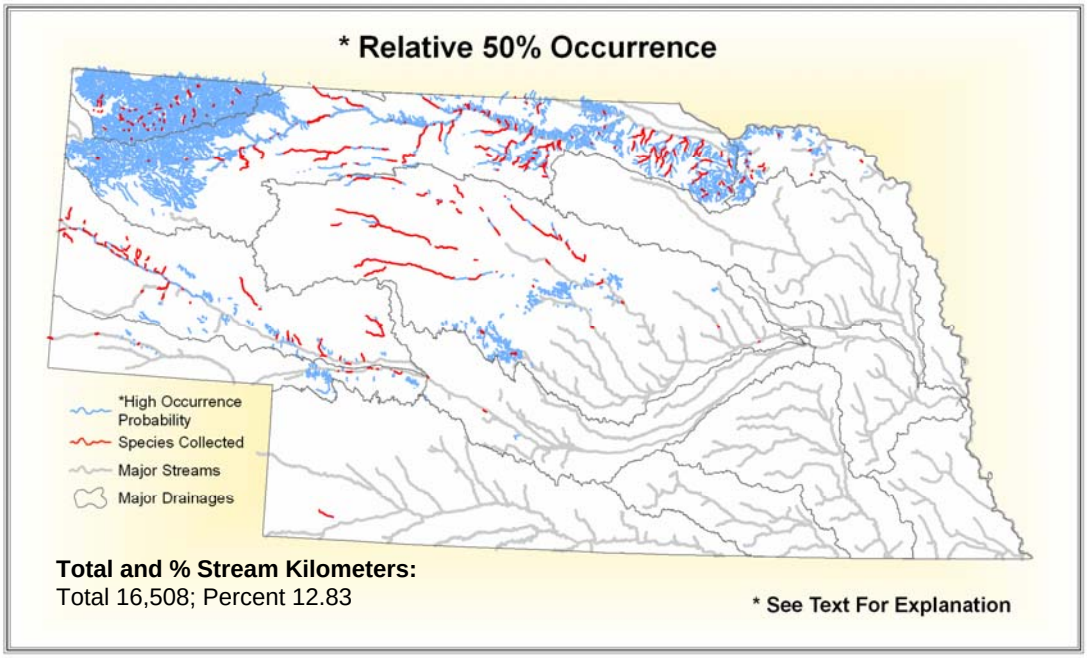
Longnose Dace

Rhinichthys Cataractae

Native: Yes
State Rank: S4
Global Rank: G5

ITIS Code: 163384
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

In Nebraska, the longnose dace is found primarily in the north and west portions of the state. The principal river drainages of its range include the Niobrara, Loup and North Platte.

Habitat Affinities:
Longnose dace prefer very clear perennial streams, however they have been found in lakes and various other types of streams. The species tends to prefer faster flowing waters than slow streams. They will generally seek out sandy areas in order to spawn. Their diet consists of small insects as well as various other invertebrates (Tomelleri and Eberle 1988).

Modeled Affinities:
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 5%
Commission: 3%
Overall: 92%

References:

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Photo Credits:

Upper Right: Photo courtesy of Konrad Schmidt, University of Minnesota, Minneapolis/St. Paul

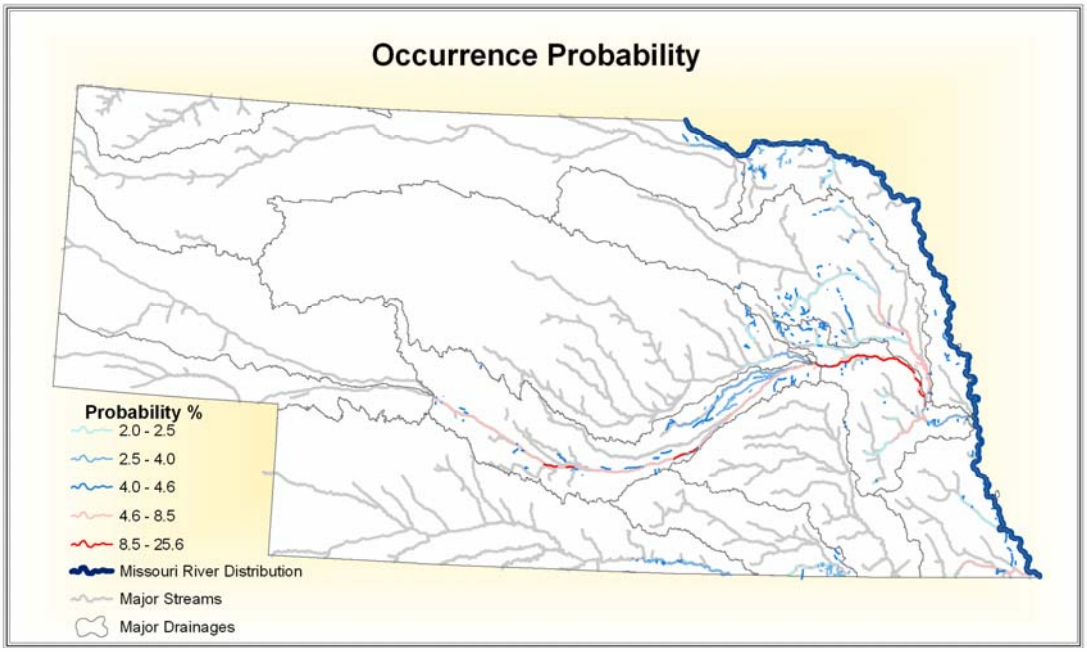
Upper Left: Photo courtesy of Noel Burkhead, Virginia Department of Game and Inland Fisheries (Fishes of Virginia)

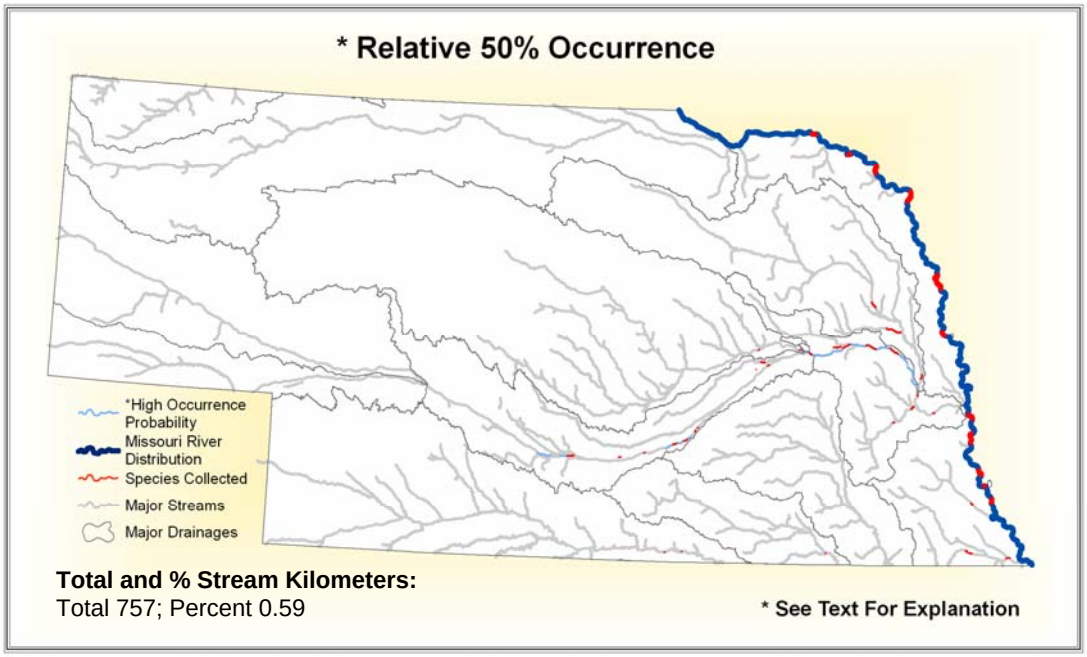
Longnose Gar

Lepisosteus osseus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161094
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The longnose gar's range includes the larger rivers and tributaries of eastern Nebraska. In the Platte River the longnose gar is found below the North and South Platte River confluence. The species can also be found in the Elkhorn and Republican Drainages. The species is most common in the Missouri River (Morris, Morris, and Witt 1974).

Habitat Affinities:
The longnose gar prefers the clearest waters of creeks, low gradient streams, oxbows and especially large rivers and impoundments where it typically inhabits sluggish pools and backwaters (Clay 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It also inhabits the overflow ponds, river bayous and swamps of lowland areas (Etnier and Starnes 1993; Robinson and Buchanan 1988), and shallow lakes and the tributaries of large rivers in the north (Eddy and Underhill 1974; Phillips et. al. 1982). In Missouri, the longnose gar adults thrive in the large, deep pools of artificial impoundments and young prefer shallow backwaters, usually containing dense aquatic vegetation (Pflieger 1997). The longnose gar migrates upstream to spawn in smaller streams with higher gradient and gravelly, weedy substrates (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 4%
Overall: 95%

References:

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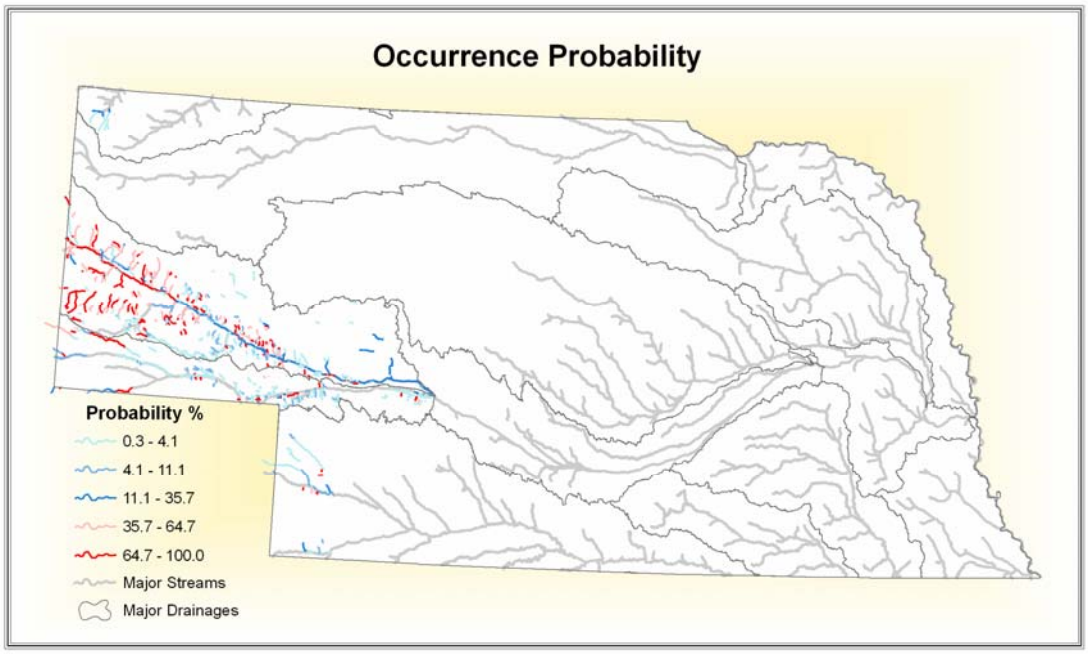
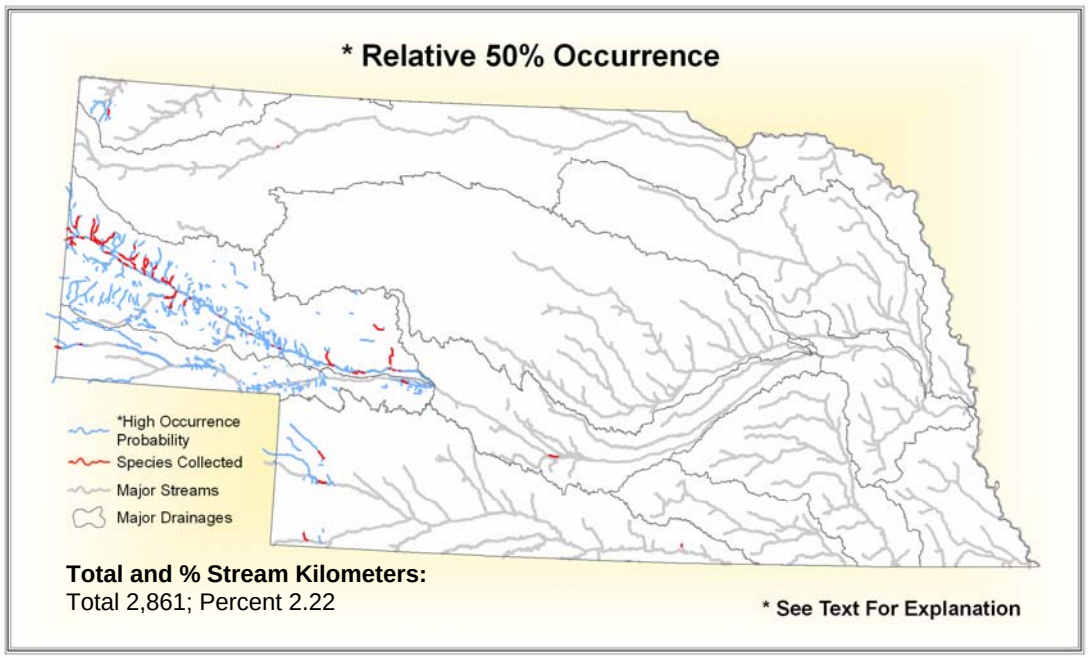
Longnose Sucker

Catostomus Catostomus

Native: Yes
State Rank: S4
Global Rank: G5

ITIS Code: 163894
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The longnose sucker's is concentrated in western Nebraska within the North and South Platte River drainages. There are other more isolated occurrences of the species located in the Republican and White-Hat drainages.

Habitat Affinities:

Common in both lakes and streams, the longnose sucker is found in warm and cold waters. In the South Platte River, longnose suckers are usually found in the same areas as white suckers (Propst 1982). Although found in both pool and riffle areas, longnose suckers are apt to be in waters near areas of moderate to high flow velocities. Typically a bottom feeder, they consume algae, crustaceans, snails, and insect larvae. The species also spawns in shallow streams where the water flows over gravel (nature serve 2006)

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 0%
Commission: 3%
Overall: 97%

References:

Bailey, M. M. 1969. Age, growth, and maturity of the longnose sucker, *Catostomus Catostomus*, of Western Lake Superior. J. Fish. Res. Board Can. 26(5):1289-1299.

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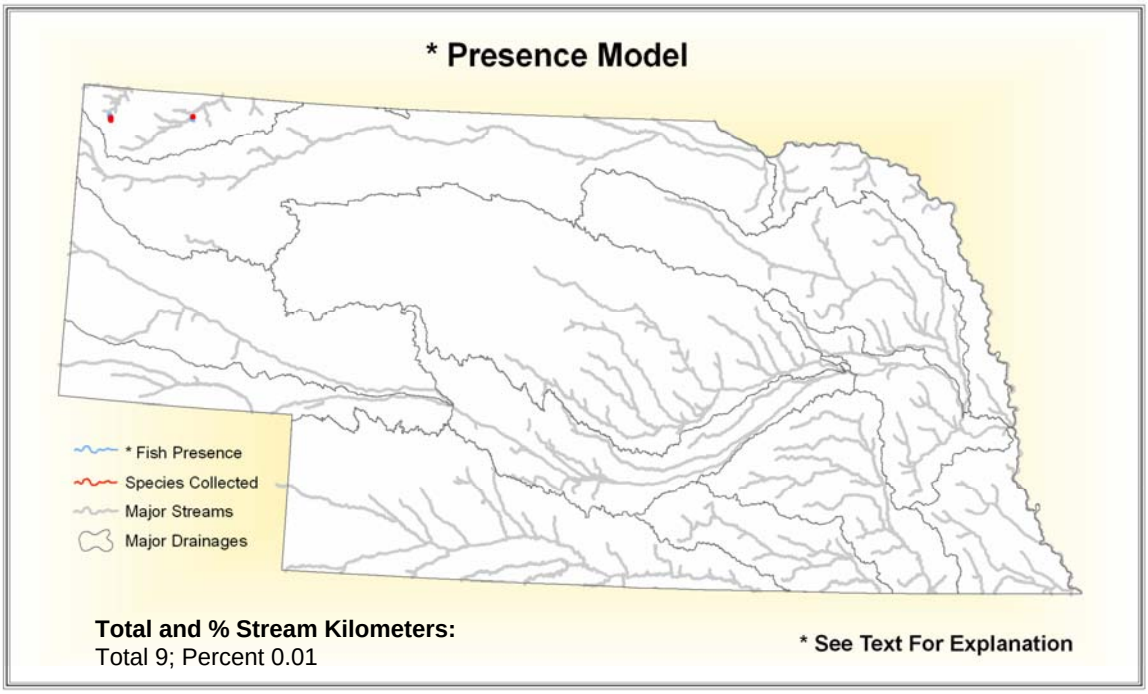
Upper Right: Photo courtesy of Minnesota Department of Natural Resources, University of Minnesota, Minneapolis/St. Paul

Mountain Sucker

Catostomus Platyrhynchus

Native: Yes
State Rank: S1
Global Rank: G5

ITIS Code: 163909
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Mountain suckers are a very uncommon species in the state of Nebraska and are possibly extirpated. The species is known from the White-Hat drainage of northwest Nebraska.

Habitat Affinities:

The mountain sucker lives in mountain streams with clear cold water with sand, gravel, or boulder bottoms (Wydoski and Whitney 1979). Spawning occurs in riffles below pools in June and July when water temperature is between 10.5 - 18.88 degrees C (51 - 66 F) (Smith 1966, Hauser 1969). After spawning, adults are found in habitats associated with bank cover in deep pools (Hauser 1969). Fingerling habitat consists of shallow areas with moderate current and abundant vegetation, usually behind obstructions (Wydoski and Whitney 1979). Fingerlings can also occur in deep pools. Older juveniles are usually found near cover in shallow water of moderate current (Hauser 1969). Preferred food consists almost entirely of algae scraped from the rocky substrate, however mountain suckers will also eat insect larvae (Wydoski and Whitney 1979).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 0%
Overall: 100%

References:

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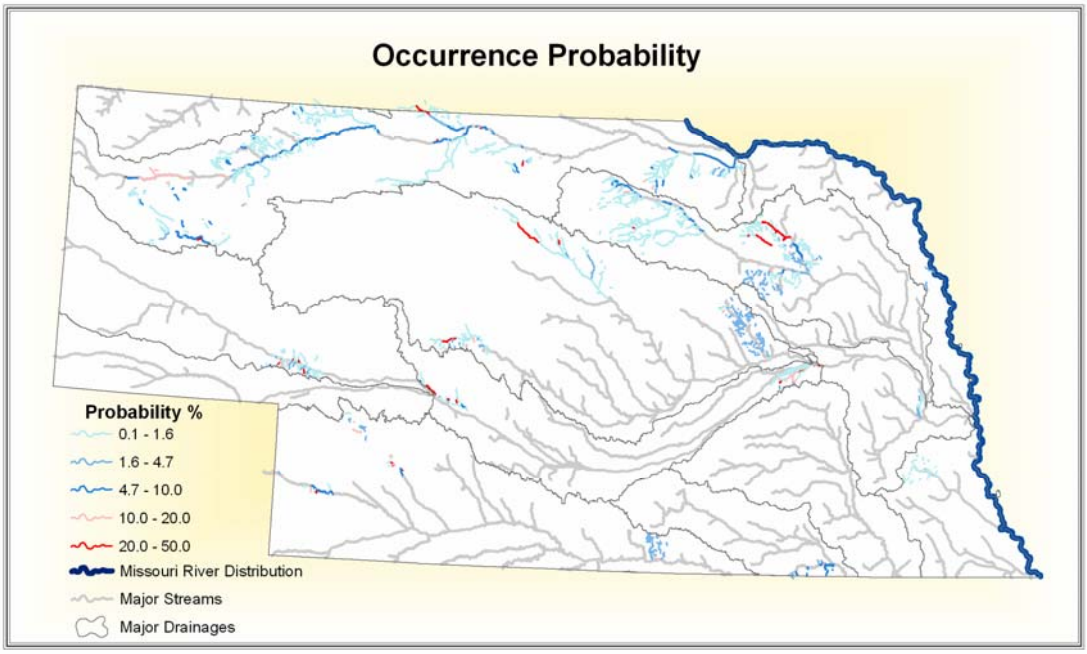
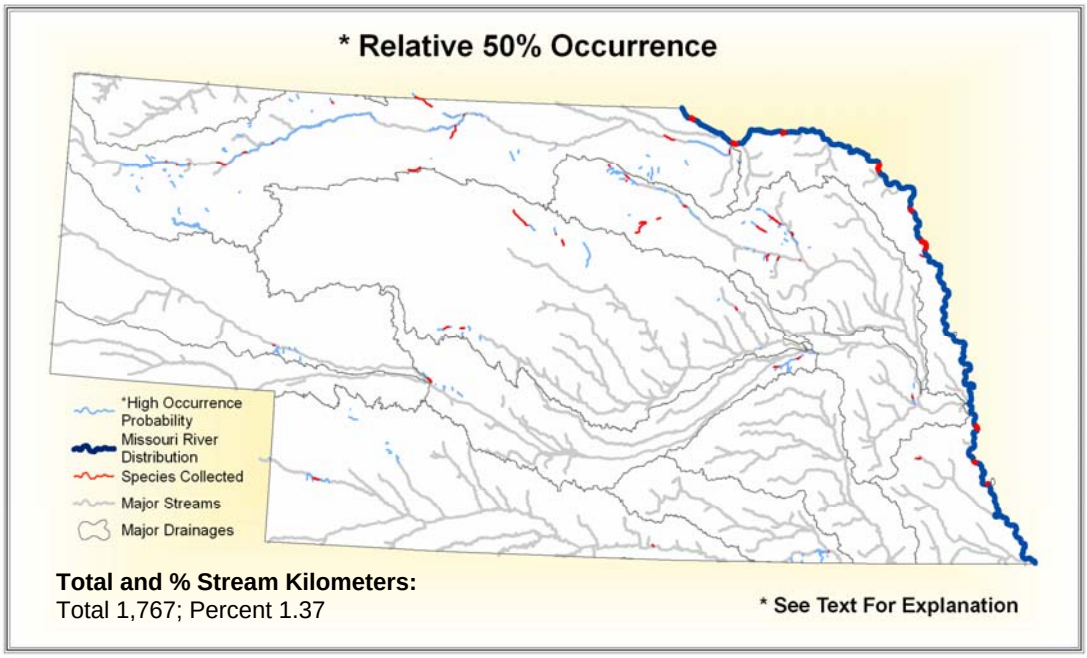
Northern Pike

Esox lucius

Native: Yes
State Rank: S4
Global Rank: G5

ITIS Code: 162139
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,767; Percent 1.37

State Range:

Northern pike can be found scattered throughout the state of Nebraska and are more common in the state than other members of the pike family (Morris, Morris, and Witt, 1974). The species has a scattered distribution in the state of Nebraska, however, most of their range is contained within the Niobrara and Elkhorn drainages. They are also found throughout the Missouri River in the state of Nebraksa.

Habitat Affinities:
The northern pike mainly inhabits the clear, cool, quiet, and densely vegetated areas of bays, marshes, lakes, and pools of low-gradient streams and rivers of the northern United States (Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 5%
Overall: 95%

References:

Alldridge, N. A. & A. M. White. 1980. Spawning site preferences for northern pike (*Esox lucius*) in a New York marsh with widely fluctuating water levels. *Ohio Journal of Science*. 80:13.

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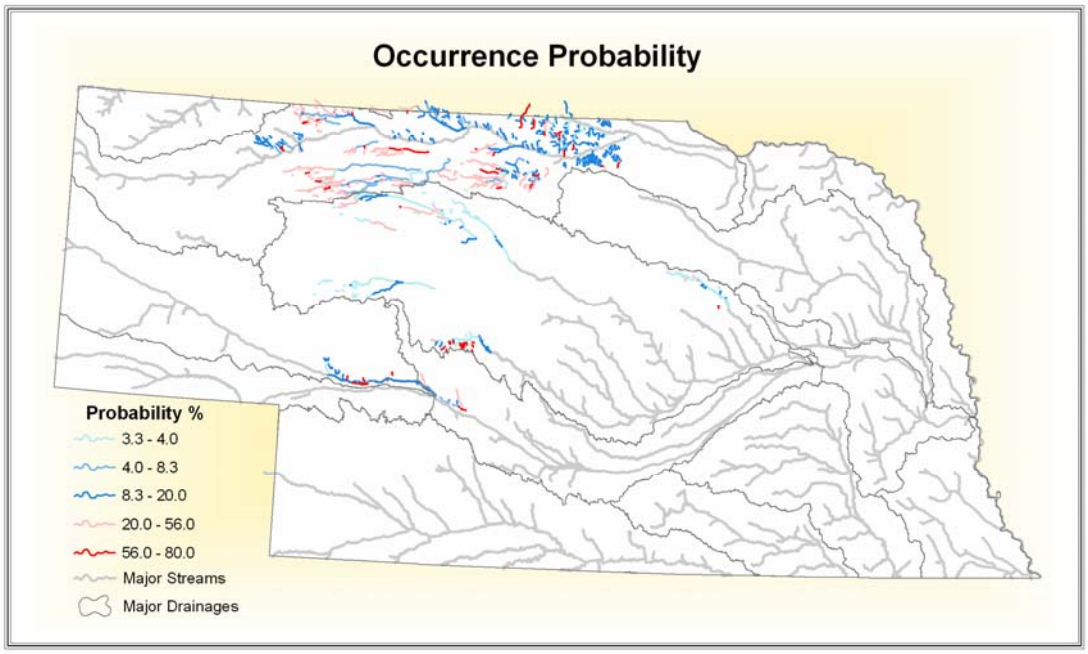
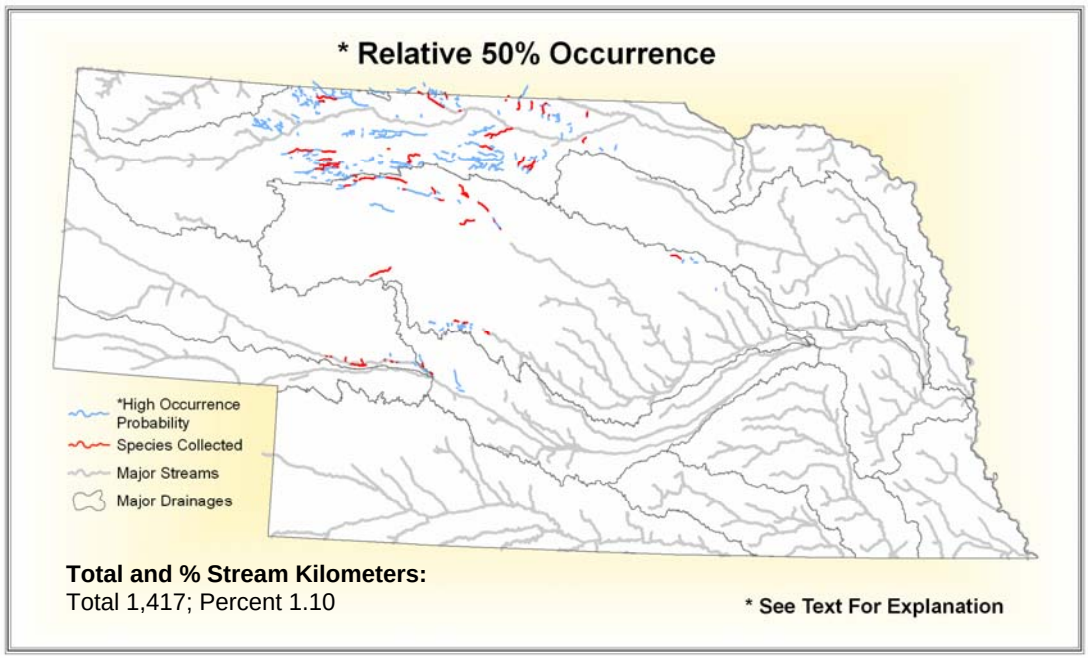
Northern Redbelly Dace

Phoxinus Eos

Native: Yes
State Rank: S3
Global Rank: G5

ITIS Code: 163592
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The northern redbelly dace is another uncommon species in the state of Nebraska and has been known to be found in the Snake River, Beaver Creek and Minnechaduza Creek (Morris, Morris and Witt 1974). Its range also includes the north central part of the state in the Loup, Niobrara, North Platte and Middle Platte drainages.

Habitat Affinities:

The northern redbelly dace generally inhabits the same waters as the finescale dace and the two species will generally interbreed. They can generally be found around beaver ponds, but also prefer cool creeks, lakes and can sometimes be found in cool bogs (Tomelleri and Eberle 1988). The species is often located near vegetation and around silt (Lee 1980, Page and Burr 1991).

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 1%
Overall: 98%

References:

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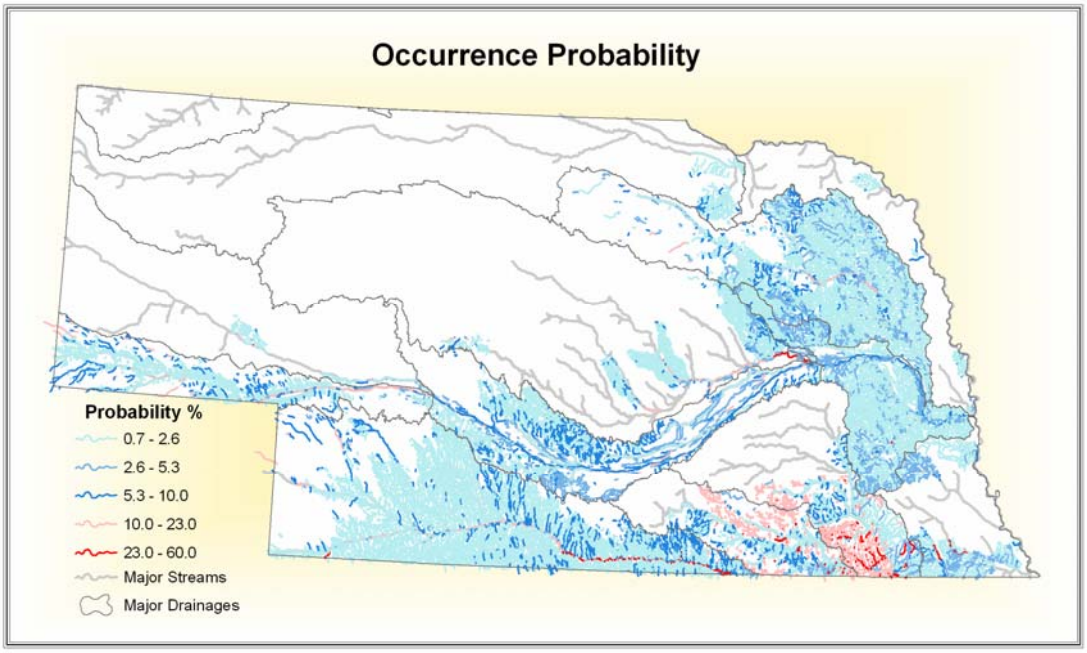
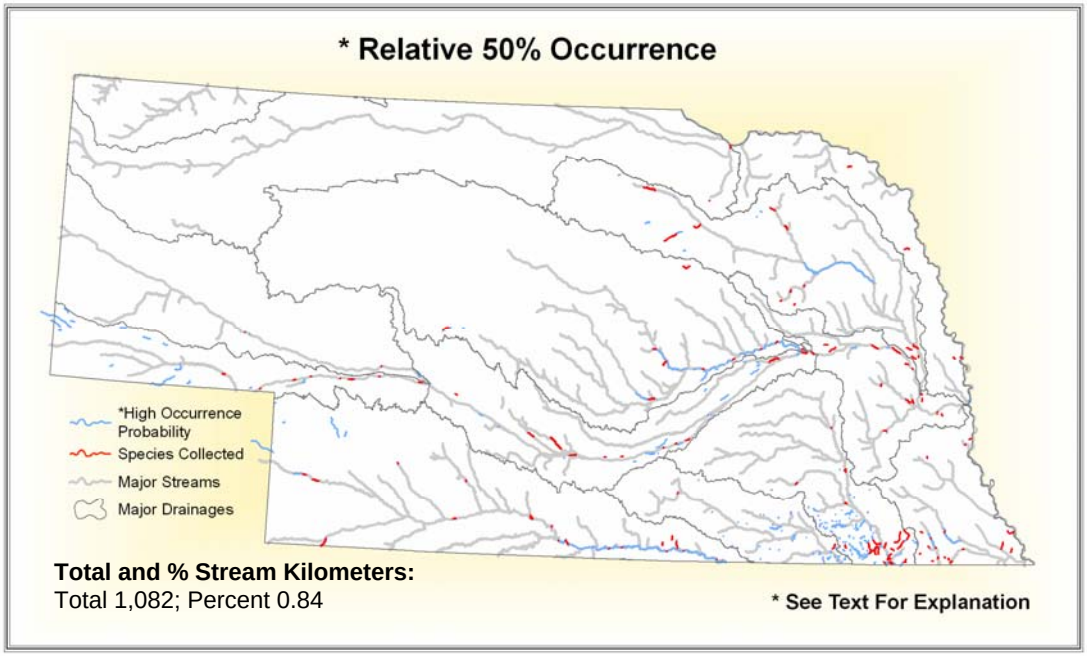
Orangespotted Sunfish

Lepomis humilis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168151
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,082; Percent 0.84

State Range:

The orangespotted sunfish's range generally consists of most major river drainages in the southern and eastern portions of Nebraska.

Habitat Affinities:
The orangespotted sunfish is primarily a lowland stream fish, occupying slow flowing, muddy or turbid waters with silted gravel, sand, mud, or detritus bottoms (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It also inhabits borrow pits, drainage ditches, small bayous (Douglas 1974), natural lakes, lowland oxbows, impoundments and niche reservoirs (Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The orangespotted sunfish avoids clear, cool and high gradient waters (Pflieger 1997; Trautman 1957), but Clay (1975) notes that it may invade high-gradient streams that have been subject to erosion and siltation (Clay 1975).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 4%
Commission: 1%
Overall: 95%

References:

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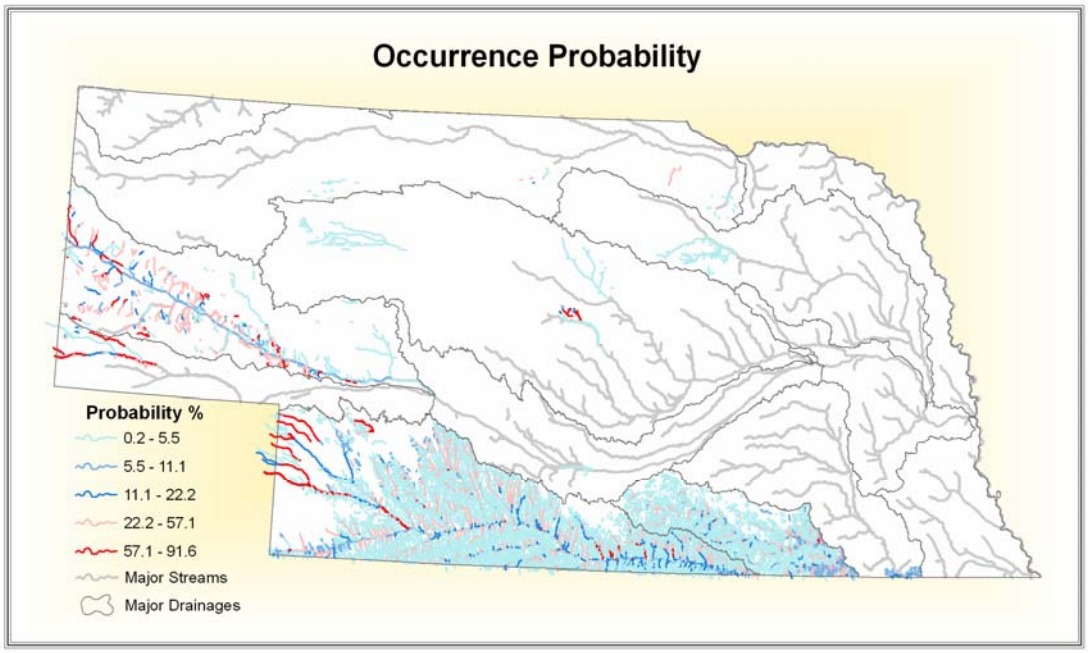
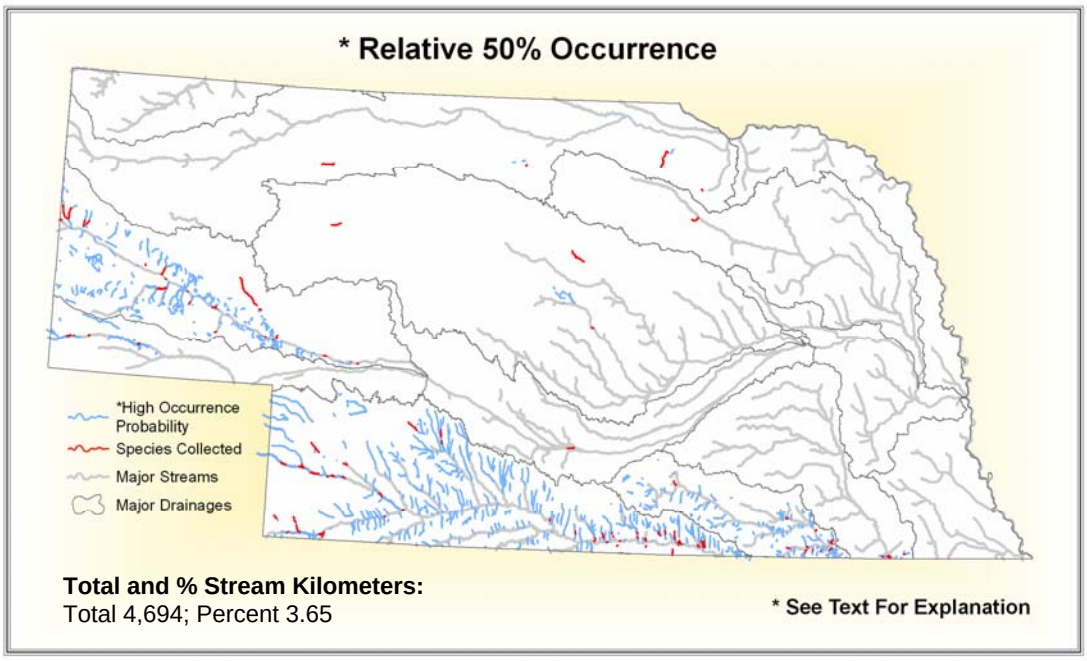
Orangethroat Darter

Etheostoma spectabile

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168368
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 4,694; Percent 3.65

State Range:

The orangethroat darter has a distribution that is somewhat scattered within the state of Nebraska. Its core range consists of the North Platte, Republican, and Little Blue River drainages. Isolated populations exist in the Niobrara, Loup, and Elkhorn drainages.

Habitat Affinities:

The orangethroat darter is primarily an upland species; preferring small headwater creeks, spring runs and small to medium streams with clear to moderate turbidity and enough current to prevent considerable silt accumulation (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). Microhabitats include runs, pools, shallow riffles, or riffle margins with bottoms of rubble, fine gravel, or mixed gravel and sand (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). The rainbow darter has direct influence on the habitat range of the orangethroat darter. Where the rainbow darter is absent, the orangethroat darter is abundant in habitats from headwater springs to small rivers. However, in areas where the rainbow darter occurs, it replaces the orangethroat darter in streams with continuous strong flow (Pflieger 1997). The orangethroat darter inhabits the rocky shorelines of some lakes in Kansas (Cross and Collins 1975), and small, localized populations can occasionally be found in the spring-fed backwaters of larger Ozark streams (Pflieger 1997).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 2%
Commission: 2%
Overall: 96%

References:

Bailey, R. M., J. E. Fitch, E.S. Herald, E. A. Lachner, C. C. Lindsey, C.R. Robins, & W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada American Fisheries Society Special Publication No. 6. 149 pp.

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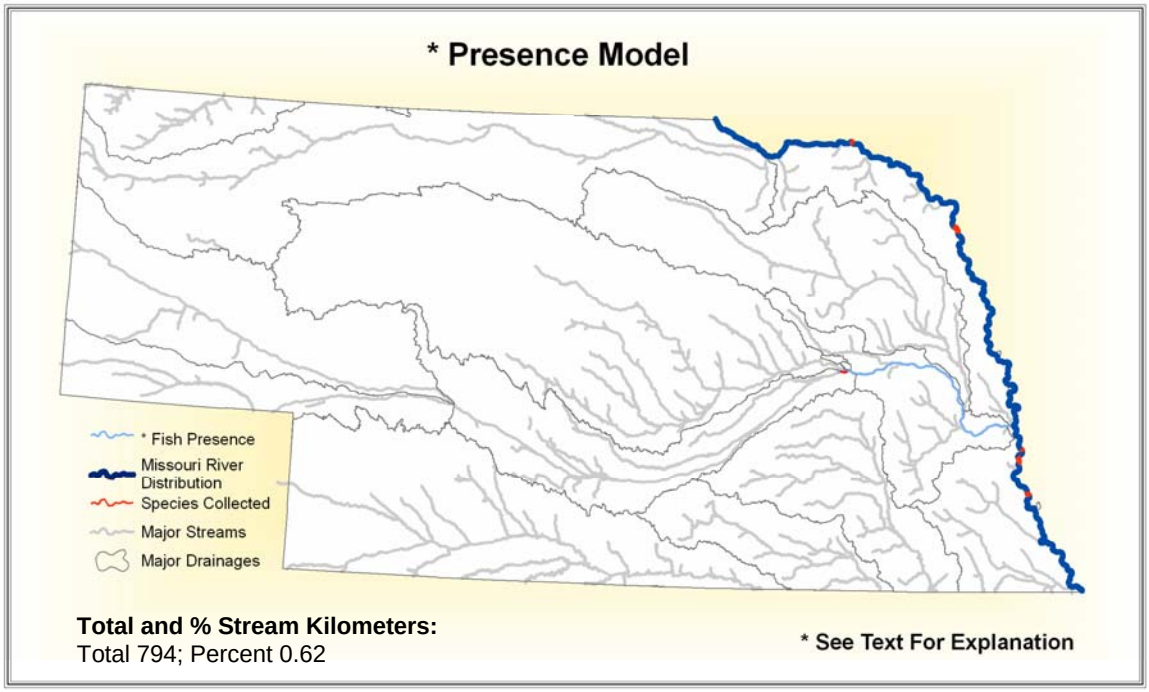
Paddlefish

Polyodon spathula

Native: Yes
State Rank: S3
Global Rank: G4

ITIS Code: 161088
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The paddlefish is not very widespread in the state of Nebraska as the species generally needs large waters to survive. As a result, the paddlefish is located primarily in the Missouri and lower Platte Rivers.

Habitat Affinities:

The paddlefish is a highly mobile species spending most of its life in sluggish pools, bayous, lowland oxbow lakes, impoundments, reservoirs and large, low-gradient rivers with rich growths of phytoplankton for feeding (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). However, there must be a river with extensive gravel bars attached to these habitats in order for spawning to occur (Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988). Much of its natural habitat has been destroyed by stream channelization, levee construction, impoundment, pollution and drainage of streams and bottomland lakes (Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 4%
Overall: 96%

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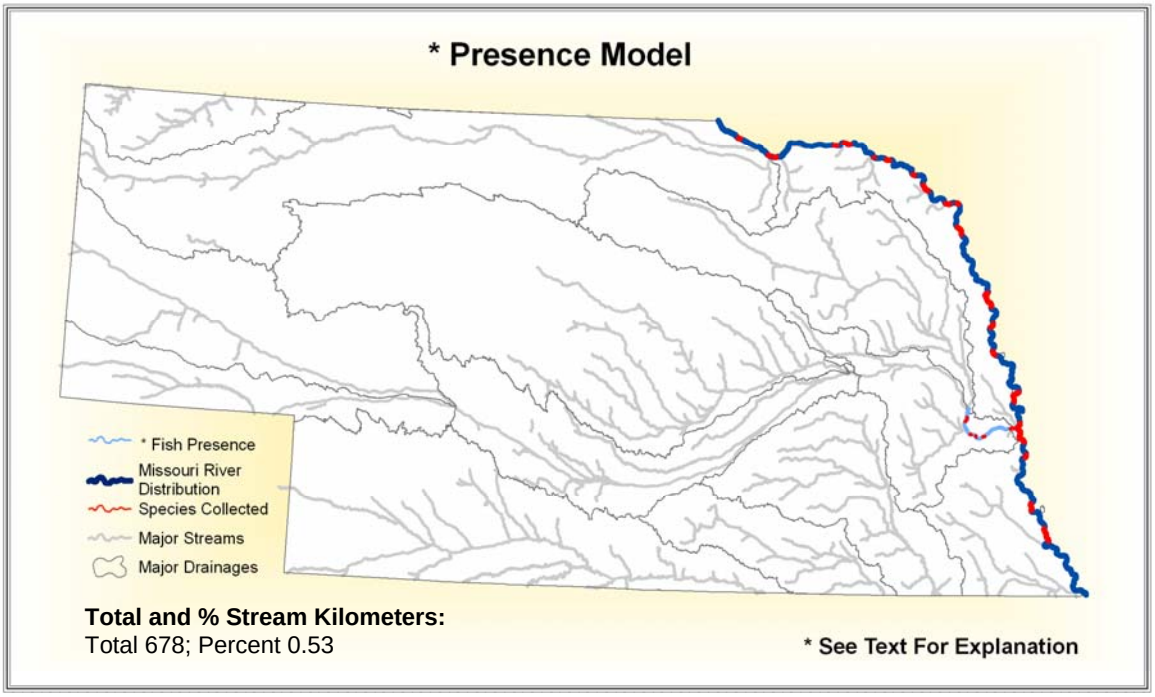
Pallid Sturgeon

Scaphirhynchus albus

Native: Yes
State Rank: S1
Global Rank: G1

ITIS Code: 161081
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The pallid sturgeon is uncommon to the state of Nebraka and is generally only found in restricted numbers from the Missouri River (Morris, Morris and Witt 1974). The pallid sturgeon can also be found in the lower reaches of the main stem of the Platte River.

Habitat Affinities:
The pallid sturgeon inhabits mainstreams of large turbid rivers with swift current and substrates of firm sand or gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). However, it is rare throughout most of its range (Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). In Nebraska, the pallid sturgeon most common along sand bars and in deeply scoured trenches below wing dams.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 3%
Overall: 97%

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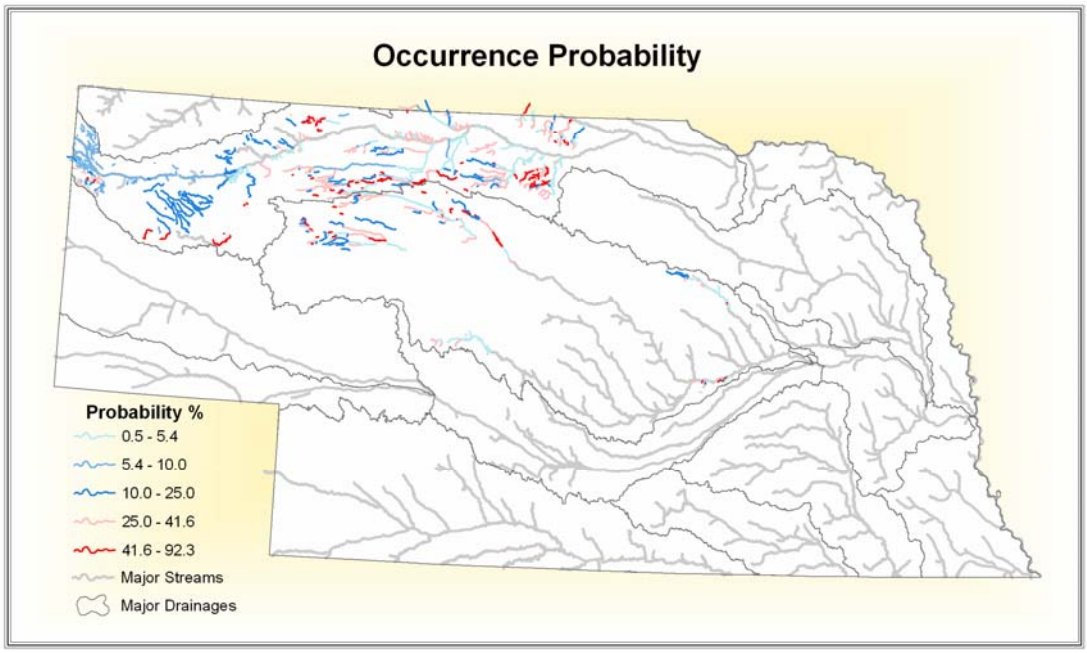
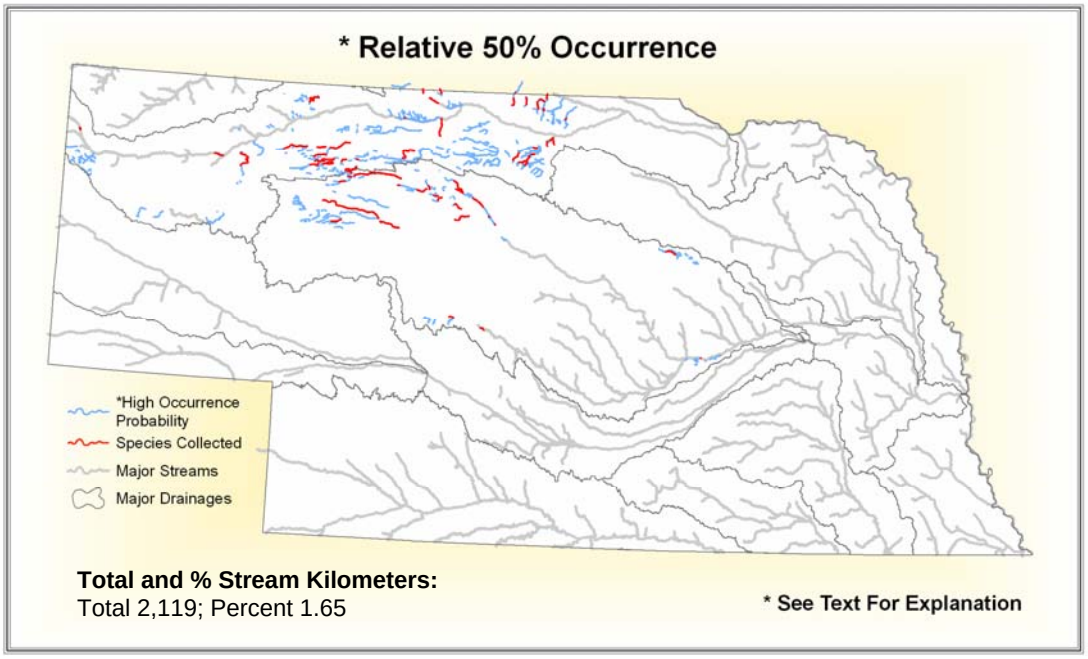
Pearl Dace

Margariscus Margarita

Native: Yes
State Rank: S3
Global Rank: G5

ITIS Code: 163873
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The pearl dace is most common in northwest Nebraska where it is found in the Snake and Niobrara Rivers. In the Loup drainage pearl dace can be found in the Middle, South and North Loup Rivers, Beaver Creek and the lower portion of the Loup River.

Habitat Affinities:

The pearl dace prefer small cool streams that are clear to slightly turbid waters. The streams that they usually inhabit have sandy or gravelly bottoms (Scott and Crossman 1973). The species will usually reside in streams that have a slight to moderate flow (Scott and Crossman 1973). Pearl dace will usually feed on various types of insects and small creatures.

Modeled Affinities:

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 1%
Overall: 98%

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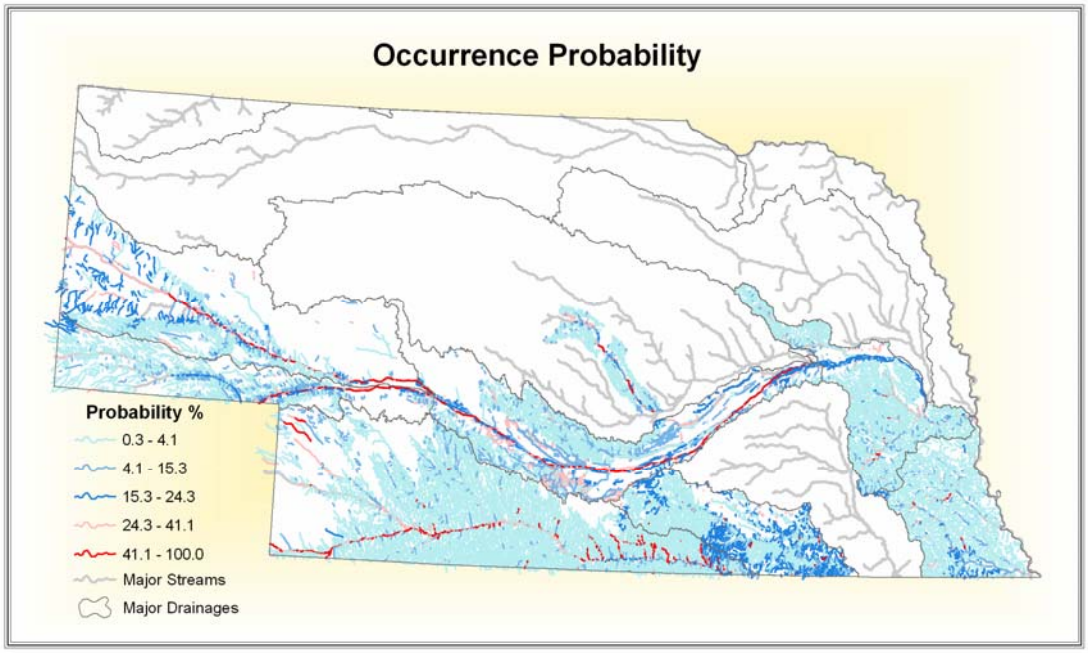
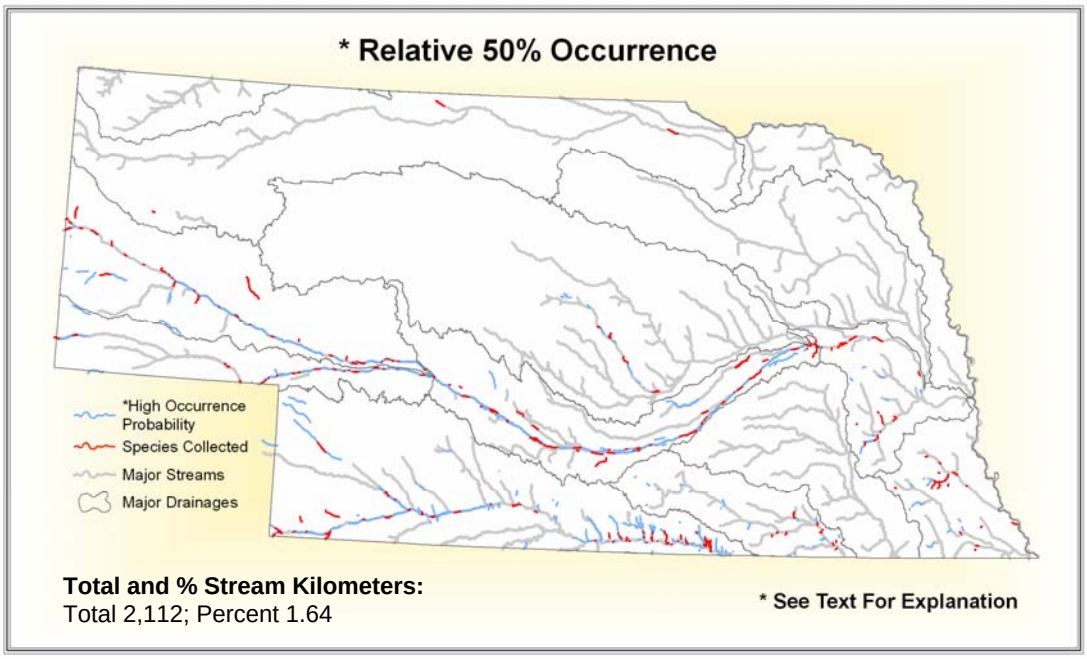
Plains Killifish

Fundulus zebrinus

Native: Yes
State Rank: S2
Global Rank: G5

ITIS Code: 165658
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,112; Percent 1.64

State Range:

The plains killifish is located primarily south of Platte River drainage. The species can be found almost anywhere in the North Platte, South Platte, Middle Platte, Republican, Little Blue, Lower Platte and the Nemaha drainages. There is also a population that extends partially up the Loup River north of the Platte drainage.

Habitat Affinities:
The plains killifish does not compete well in areas with high fish diversity and is limited to saline or alkaline habitats (Pflieger 1997). If these conditions are met, it can be found in many different habitats from shallow, sandy streams with strong current to pools and backwaters lacking current (Cross and Collins 1975; Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 4%
Commission: 3%
Overall: 93%

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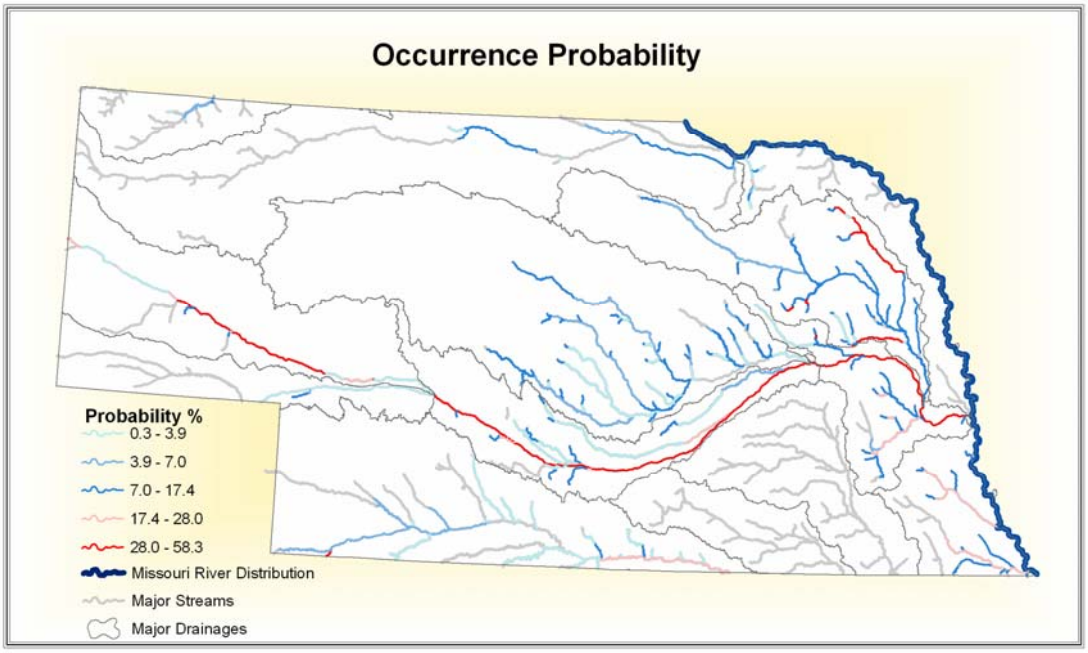
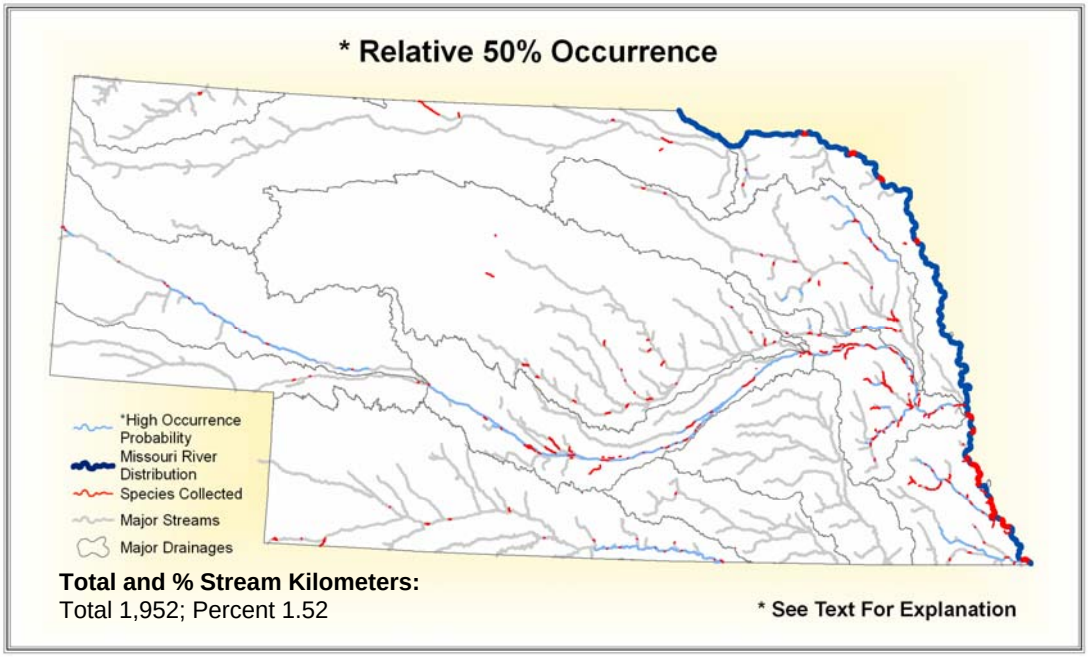
Plains Minnow

Hybognathus placitus

Native: Yes
State Rank: S2
Global Rank: G4

ITIS Code: 163361
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,952; Percent 1.52

State Range:

The plains minnow can be found throughout much of Nebraska, largely following the major river systems of the state. The largest populations are located in the immediate tributaries of the Republican, Platte, Loup, Niobrara, Elkhorn and the Little Nemaha rivers. A small population can also be found along the White River near Lone Tree Creek.

Habitat Affinities:
The plains minnow is characteristic of broad, shallow, sandy or silty beds in turbid streams and rivers (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It reaches highest abundance in shallow backwaters and pools with gentle current and sediment accumulation, but may also be found in shallow runs with moderate current (Cross and Collins 1975; Tomelleri, 1990). Irrigation and dewatering of rivers have eliminated the plains minnow in much of its former range (Tomelleri, 1990).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 5%
Commission: 6%
Overall: 89%

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Upper Left: Photo courtesy of the Missouri Department of Conservation, Missouri Fish and Wildlife Information System, www.conservation.state.mo.us.

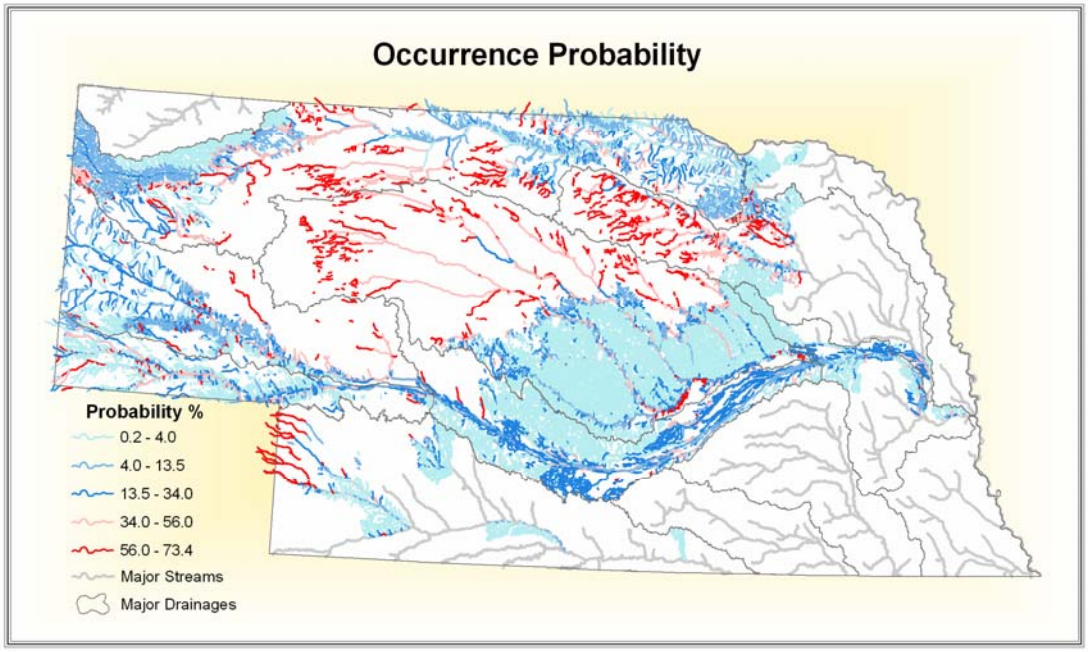
Upper Right: Photo courtesy of the Virtual Field Trip Network, Texas Education Agency, www.vftn.org/projects/craig/ecology/collect/collect_fish1.htm.

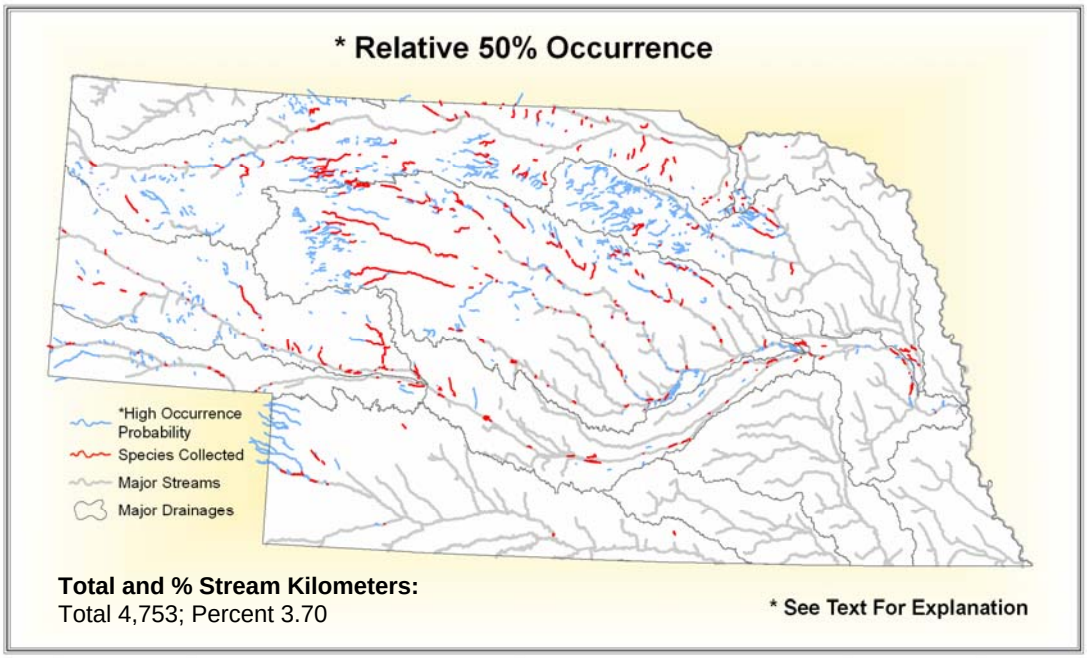
Plains Topminnow

Fundulus sciadicus

Native: Yes
State Rank: S3
Global Rank: G4

ITIS Code: 165666
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 4,753; Percent 3.70

State Range:

The plains topminnow can be found in central to north central Nebraska. The core range of the species consists of the Loup, Middle Platte, Niobrara, Lower North Platte and upper Elkhorn drainages. Other scattered populations exist elsewhere.

Habitat Affinities:
The plains topminnow inhabits the clear, quiet pools, backwaters, and overflow pools of small creeks and larger streams with abundant submerged aquatic vegetation and moderate current (Cross and Collins 1975; Pflieger 1997; Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 11%
Commission: 1%
Overall: 88%

References:

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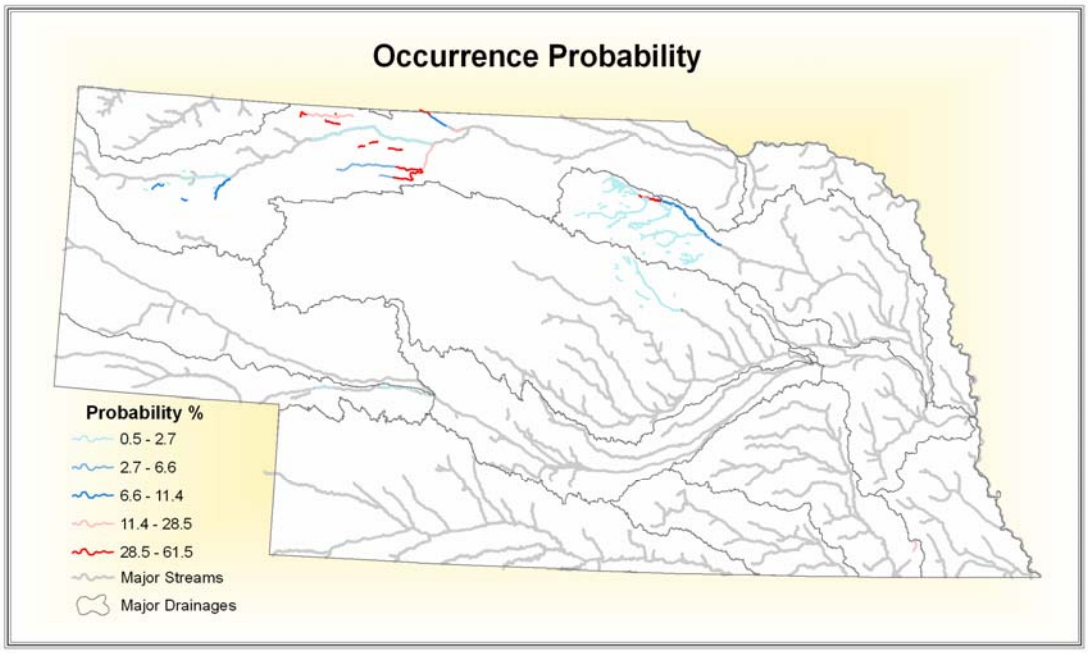
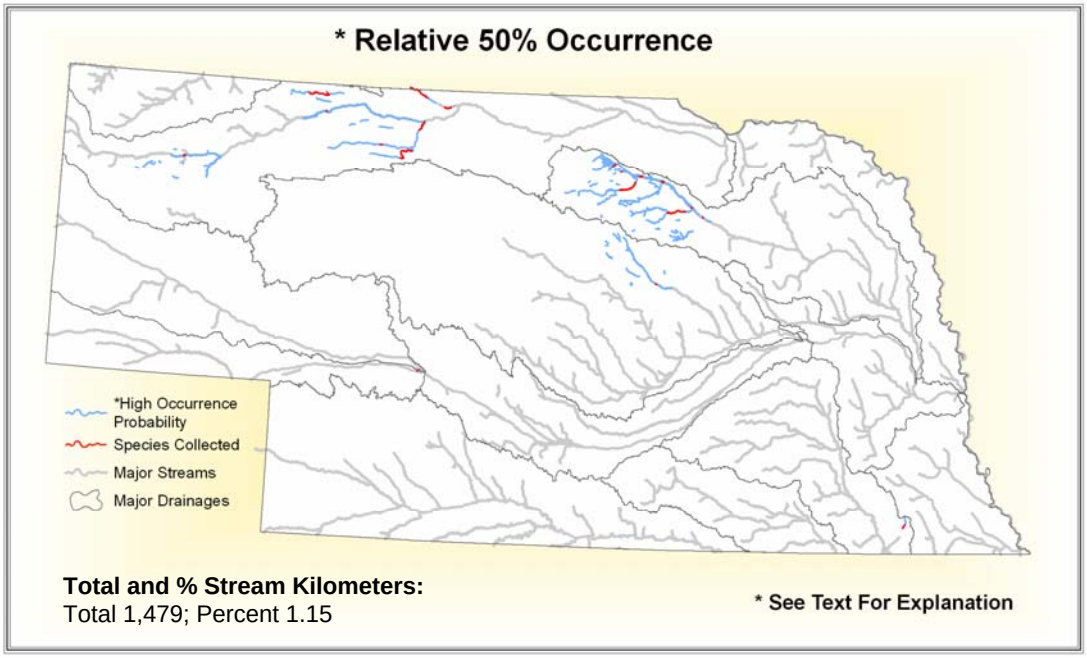
Pumpkinseed

Lepomis gibbosus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168144
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Pumpkinseed populations are only found in a few places in northern Nebraska. The broadest distributions can be found along the middle Niobrara as well as along the northern reaches of the Elkhorn River. Three other scattered and isolated populations are located in the Loup, South Platte, and the Big Blue drainages.

Habitat Affinities:
The pumpkinseed is an inhabitant of clear, quiet sluggish water with large stands of rooted aquatic vegetation and bottoms of muck or sand covered with organic debris (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Trautman 1957). The pumpkinseed is common in clear, northern lakes and large streams (Eddy and Underhill 1974l; Phillips et. al. 1982), and has been successfully introduced into two reservoirs in Tennessee (Etnier and Starnes 1993).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 98%

References:

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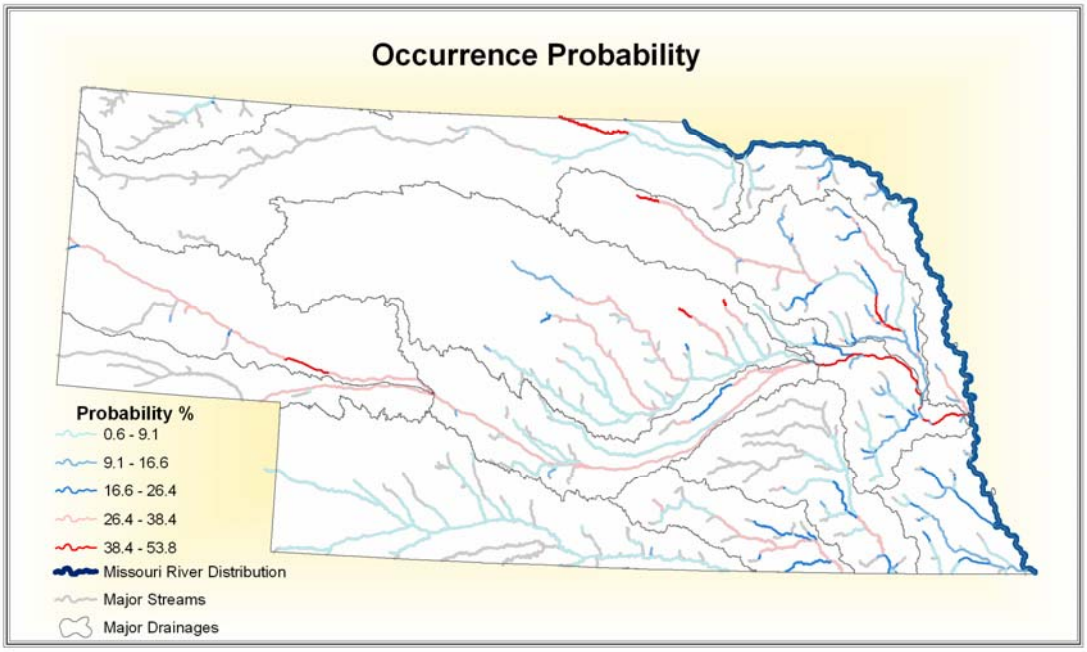
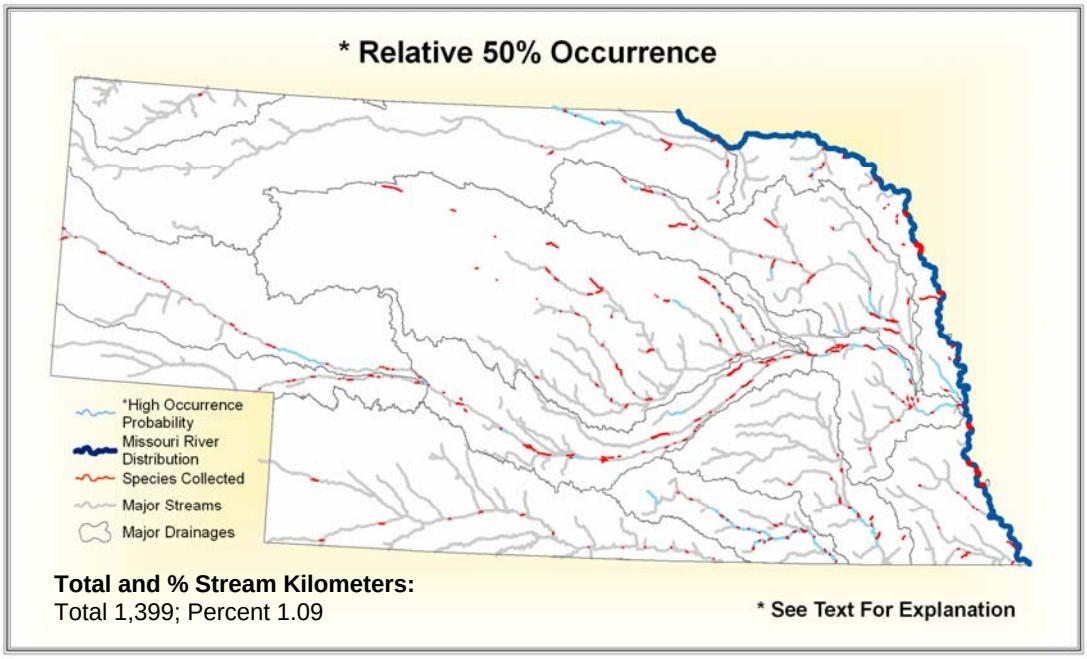
Quillback

Carpiodes cyprinus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163917
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The quillback can be found throughout the state of Nebraska. Most collection records occur along the Republican, Platte, Elkhorn, Loup Nemaha, Big and Little Blue Rivers. They also are present in the Missouri River as well as the lower portion of the Niobrara River.

Habitat Affinities:
The quillback inhabits reservoirs, lakes and low gradient parts of streams with large, permanent pools and coarse bottom material (Clay 1975; Pflieger 1997; Etnier and Starnes 1993). In Kansas, it is found only in sandy-bottomed rivers (Cross and Collins 1975). While the quillback normally lives in quiet waters, it moves to deep gravelly riffles to spawn (Pflieger 1997; Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 9%
Commission: 5%
Overall: 87%

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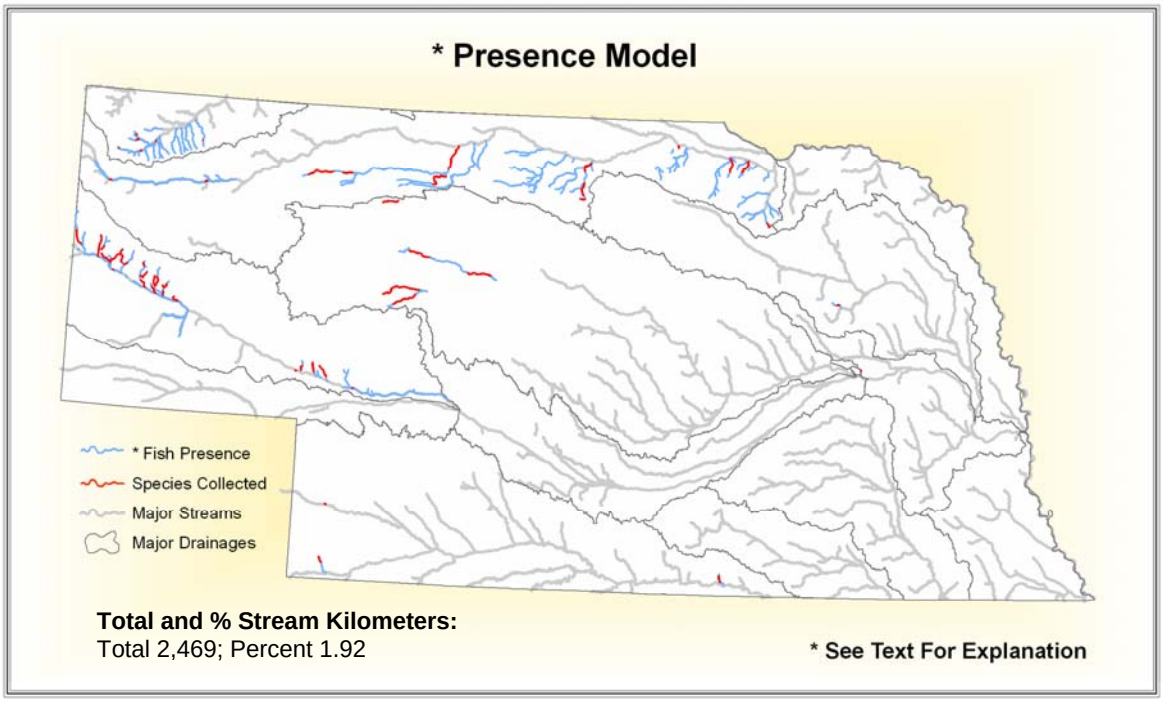
Rainbow Trout

Oncorhynchus mykiss

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 161989
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The rainbow trout population is most prevalent in the northwestern portion of the state of Nebraska, generally north of the Platte River. Other scattered populations do occur in the Republican and Elkhorn drainages.

Habitat Affinities:
While the rainbow trout tolerates slightly higher water temperatures than other trout, it prefers temperatures below 70˚ F. It inhabits streams where there are stable riffles of rocks and gravel, for nursery and spawning areas; deep pools, overhead cover, and swift current (Pflieger 1997). Rainbow trout have adapted to areas of cool, deep reservoirs as well as cold tailwaters below dams (Etnier and Starnes 1993; Robinson and Buchanan 1988). In Minnesota, rainbow trout migrate downstream after spending its first 1-3 years in smaller headwaters (Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 6%
Overall: 94%

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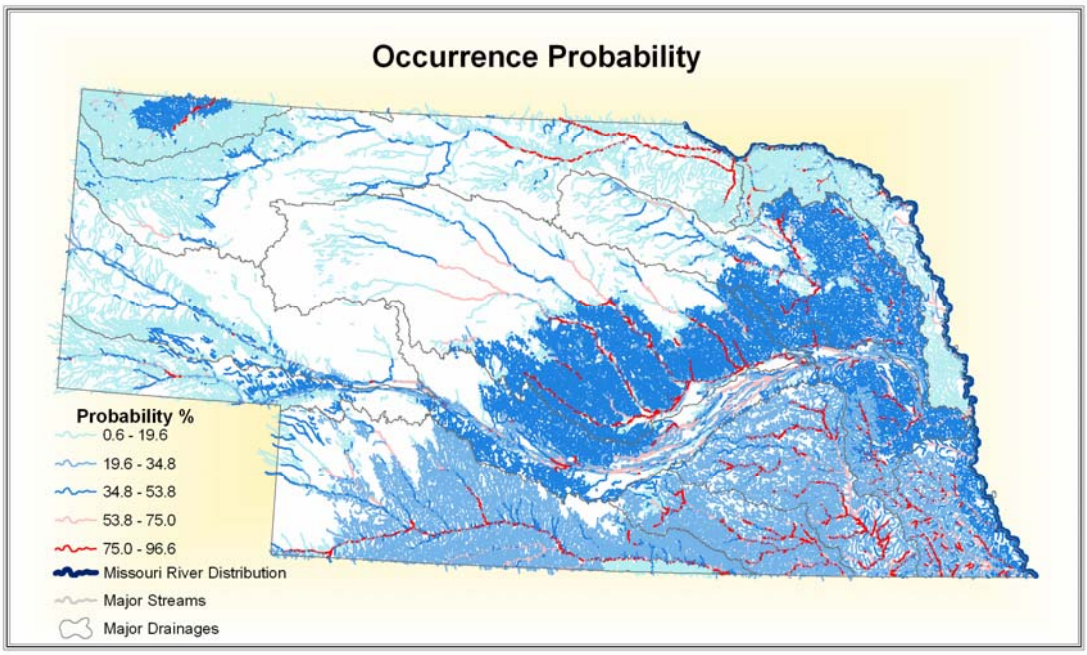
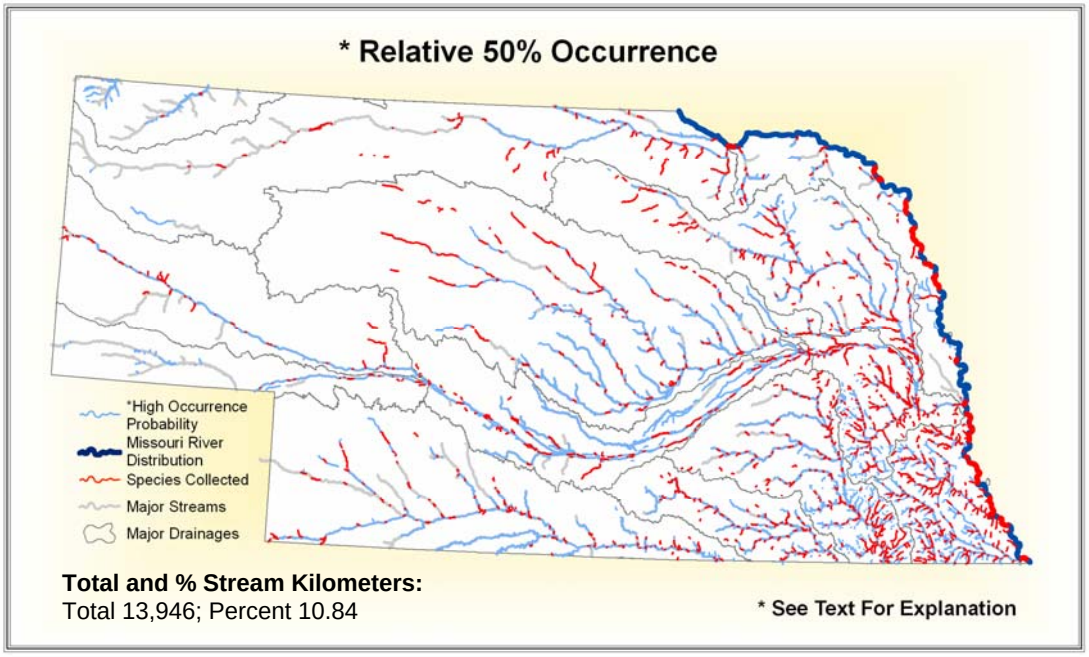
Red Shiner

Cyprinella lutrensis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163792
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:
The red shiner is a fairly common species in Nebraska and can be found almost statewide in all of the major drainages in the state.

Habitat Affinities:
The red shiner is primarily a stream fish and is most abundant in larger creeks and rivers; although it flourishes when introduced into impoundments it (Pflieger 1997). Microhabitats include still pools and riffles, slow moving streams, and backwaters over a range of bottom types (Robinson and Buchanan 1988). The red shiner is tolerant of conditions where few other fish occur such as irregular flow, siltation, turbidity and pollution (Cross and Collins 1975) and avoids streams where the water is continuously cool and clear (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 19%
Commission: 12%
Overall: 69%

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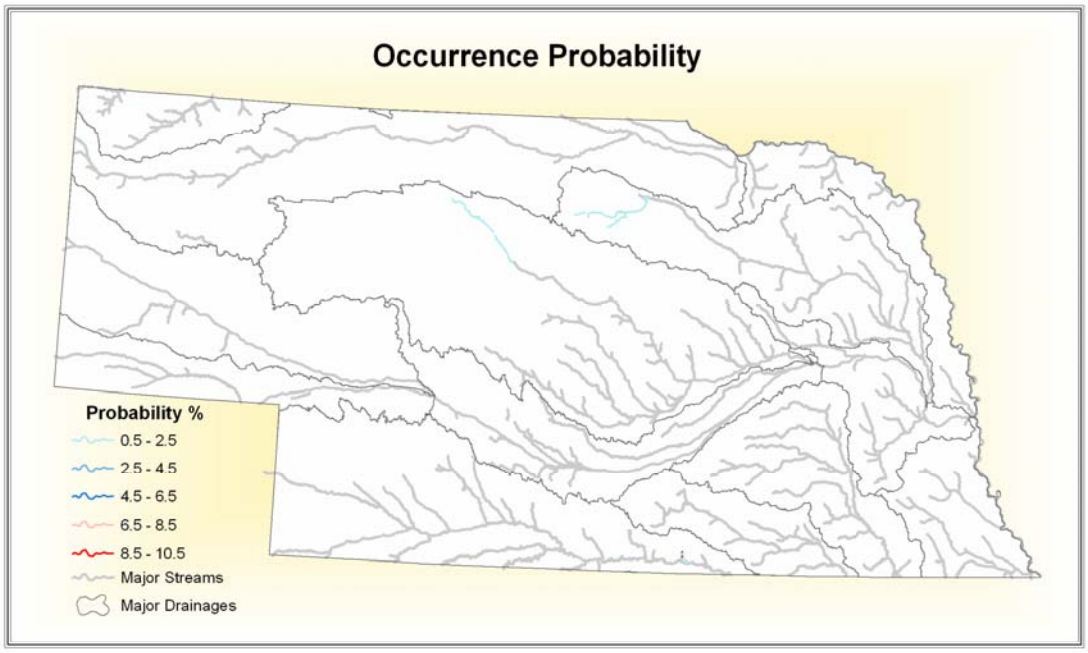
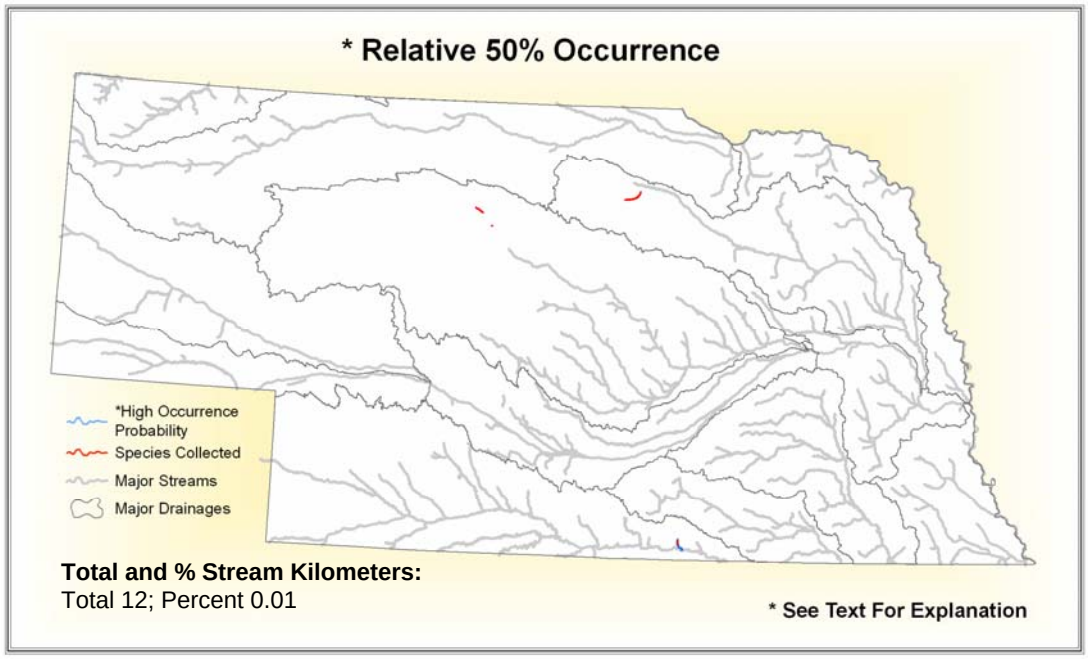
Redear Sunfish

Lepomis microlophus

Native: No
State Rank: S?
Global Rank: G5

ITIS Code: 168154
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

The redear sunfish is not very common to the state of Nebraska; it is known only from a few select areas of the state. The first of these areas is located near Elm and Crooked creeks in the Republican drainage. The second location is along Holt Creek in the Elkhorn drainage. One last isolated population exists along Goose Creek in the Loup River drainage.

Habitat Affinities:

The redear sunfish prefers the warm clear water of stream overflow areas, lakes, lowland oxbows, and other non-flowing areas with abundant logs, stumps, brush and aquatic vegetation (Douglas 1974; Etnier and Starnes 1993; Clay 1975). It tolerates silt (Robinson and Buchanan 1988) and occupies deeper water than most sunfishes (Cross and Collins 1975).).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 0%
Commission: 0%
Overall: 100%

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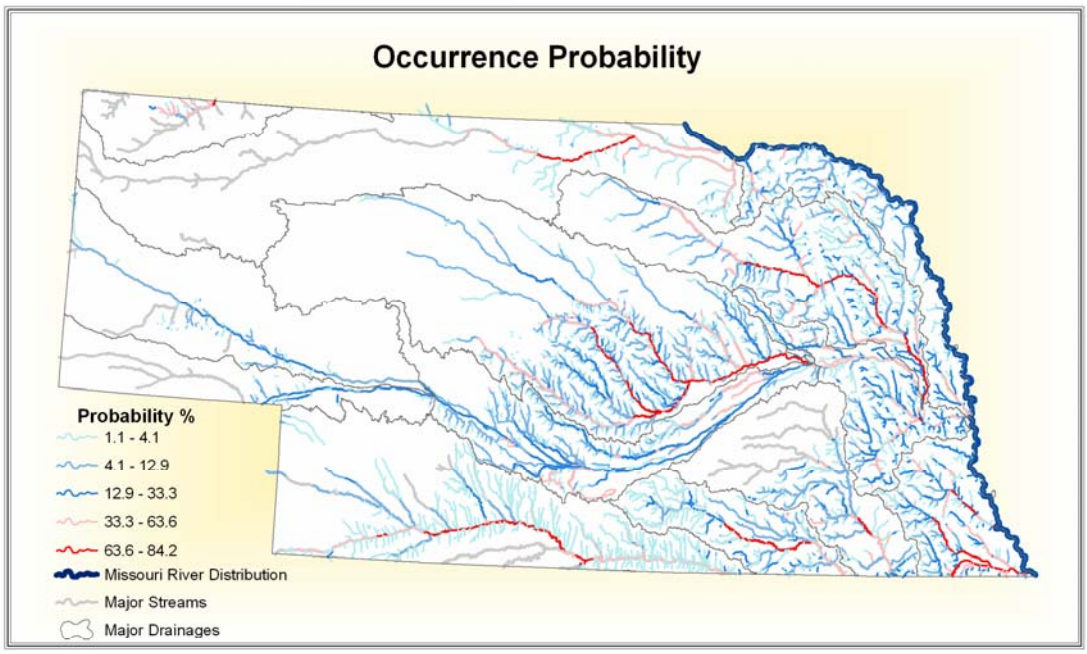
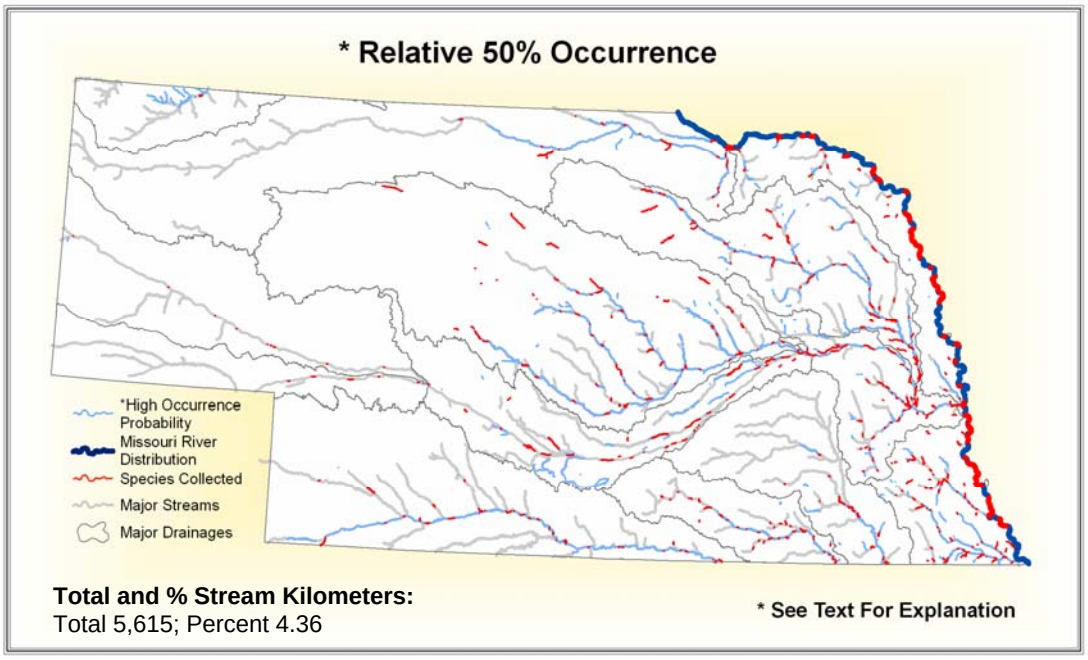
River Carpsucker

Carpiodes carpio

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163919
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 5,615; Percent 4.36

State Range:

The river carpsucker, as its name suggests, is primarily found along the major river systems of Nebraska. The largest populations can be found in and along the Missouri, Elkhorn, Loup, Platte, Republican, Niobrara, Nemaha, Big Blue and Little Blue rivers. Some of the species can be found venturing up tributaries that drain into these rivers.

Habitat Affinities:
The river carpsucker is found in quiet ponds, pools, and oxbows of major lowland rivers having low to moderate gradient (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993). In the Ohio River the largest populations occurred in the deeper waters (Trautman 1957). This carpsucker thrives in the silty, turbid waters of reservoirs and slow currents where soft bottoms of sand, clay, and gravel occur (Cross and Collins 1975). In turbid waters of Missouri, the river carpsucker is often the most populous large fish (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 9%
Commission: 7%
Overall: 85%

References:

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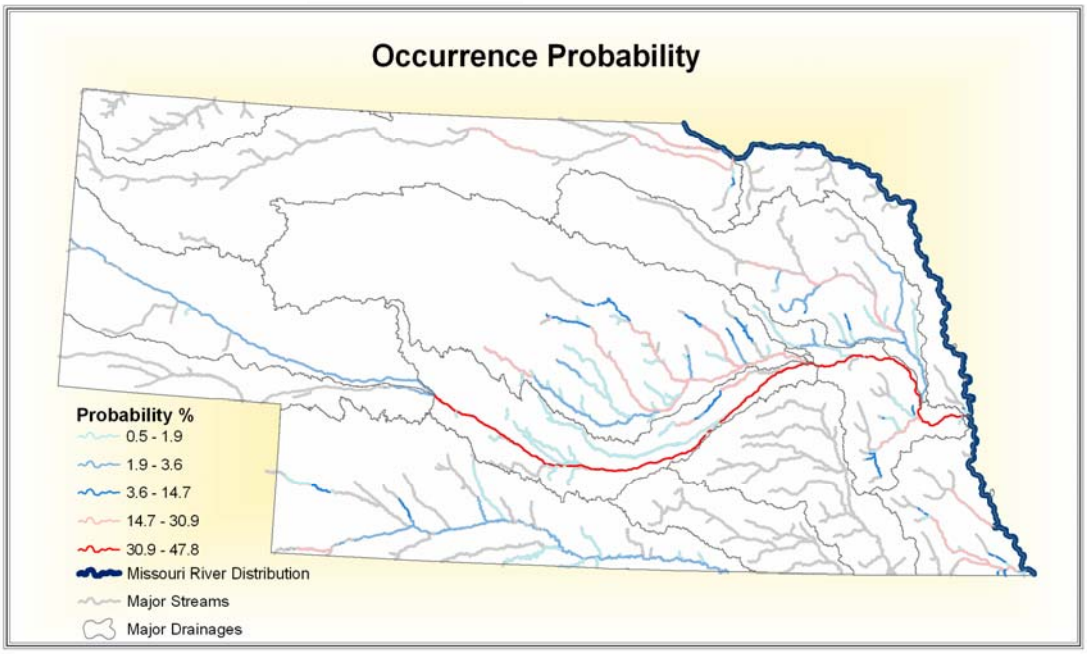
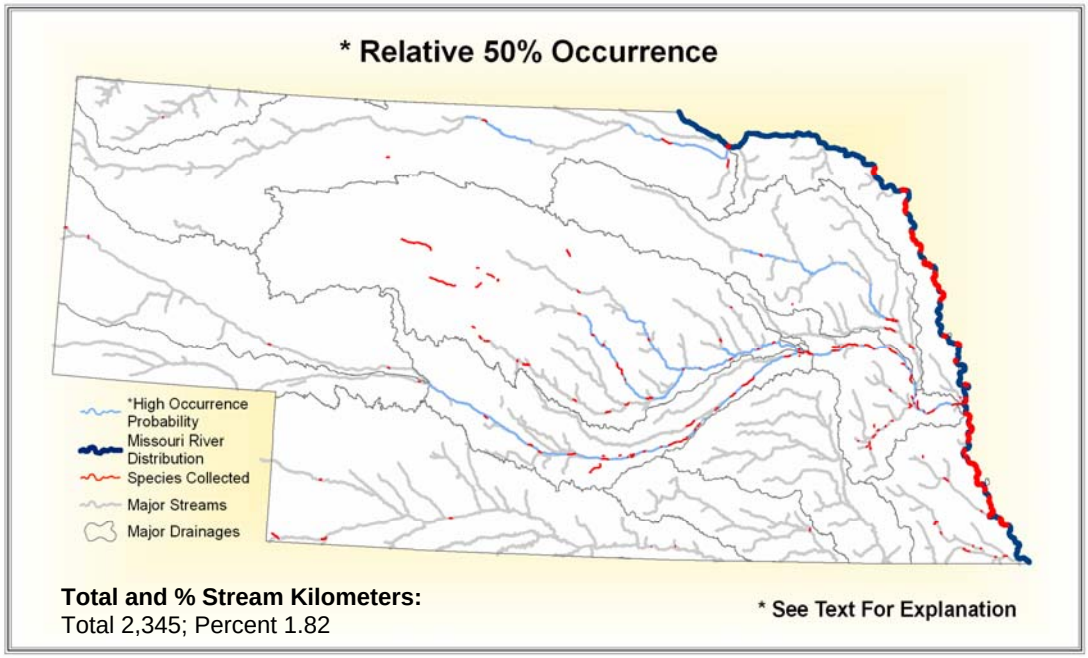
River Shiner

Notropis blennius

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163429
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,345; Percent 1.82

State Range:

The river shiner can be found across the state of Nebraska, most commonly around the river systems that run through the southern portion of the state. The primary rivers comprising its range are the Missouri, Republican, Platte, Loup and Nemaha Rivers. The species can also be found along the lower portion of the Niobrara and Elkhorn Rivers.

Habitat Affinities:
The river shiner is found in major rivers, avoiding areas of strong current and still backwaters (Pflieger 1997; Robinson and Buchanan 1988). While the river shiner occurs over substrates of all types, larger populations are found in less turbid, flowing water over sand and gravel bottoms (Cross and Collins 1975; Eddy and Underhill 1974; Pflieger 1997; Trautman 1957). River shiner numbers in the Missouri River have increased from less than 0.1% of small fishes collected in the early 1940s to 7.7% in the early 1980s (Pflieger,1987).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 3%
Commission: 4%
Overall: 93%

References:

Aadland, L. P, C. M. Cook, M. T. Negus, H. G. Drewes and C. S. Anderson. 1991. Microhabitat preferences of selected stream fishes and community-oriented approach to instream flow assessments. Minnesota Department of Natural Resources, Section of Fisheries. 142 pp.

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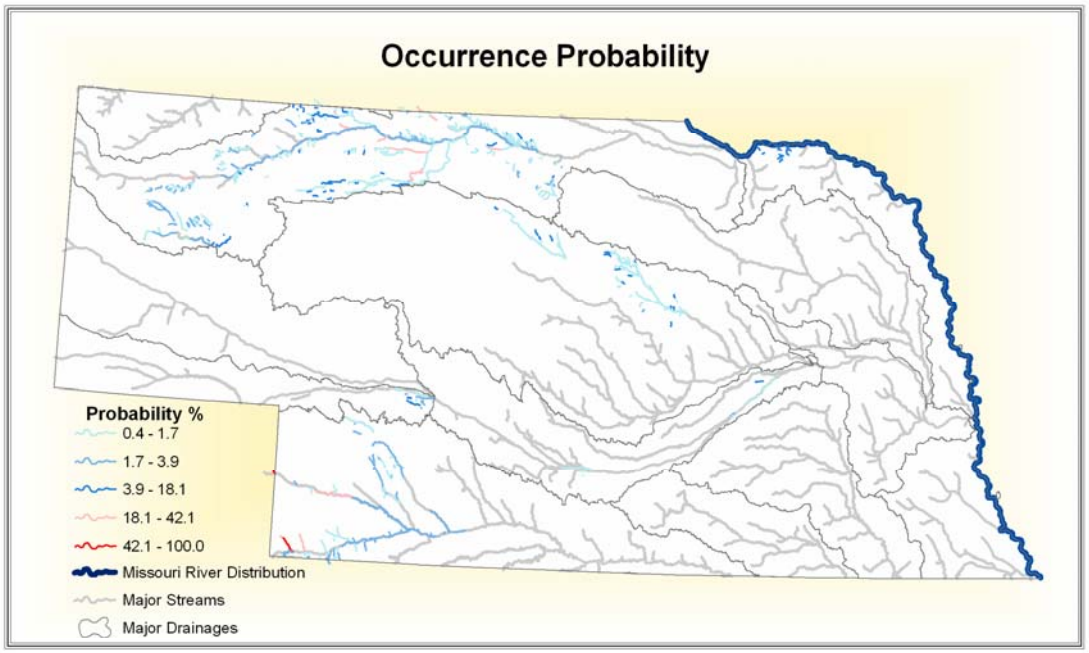
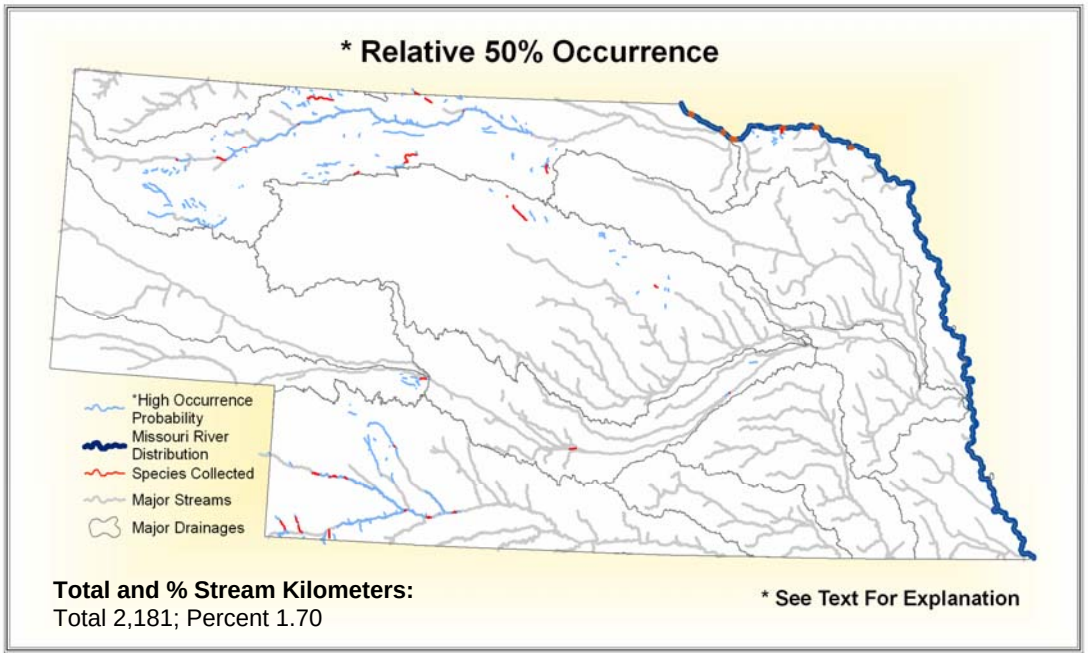
Rock Bass

Ambloplites rupestris

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163516
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,181; Percent 1.70

State Range:

The rock bass can be found in scattered locations across much of Nebraska. In addition to a Missouri River distribution, the species has patchy distributions in the Niobrara, Loup, Platte and Republican River drainages.

Habitat Affinities:
The rock bass is found in deep pools, and undercut banks of clear, small to moderate sized permanent flow streams with unsilted bottoms of bedrock, gravel, boulders or limestone ledges **(**Douglas 1974; Cross and Collins 1975; Clay 1975; Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). In its northern range the rock bass is found in lakes and reservoirs with cover provided by fallen timber, rocky shores or dense weeds (Etnier and Starnes 1993; Robinson and Buchanan 1988; Cross and Collins 1975; Eddy and Underhill 1974). In Minnesota, it can also be found in creeks and lakes with mud bottoms (Phillips et. al. 1982; Eddy and Underhill 1974). The rock bass avoids reservoirs and its young prefer protected backwaters and dense aquatic vegetation, such as parrotfeather (*Myriophyllum*) (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 5%
Overall: 95%

References:

Aadland, L. P, C. M. Cook, M. T. Negus, H. G. Drewes and C. S. Anderson. 1991. Microhabitat preferences of selected stream fishes and community-oriented approach to instream flow assessments. Minnesota Department of Natural Resources, Section of Fisheries. 142 pp.

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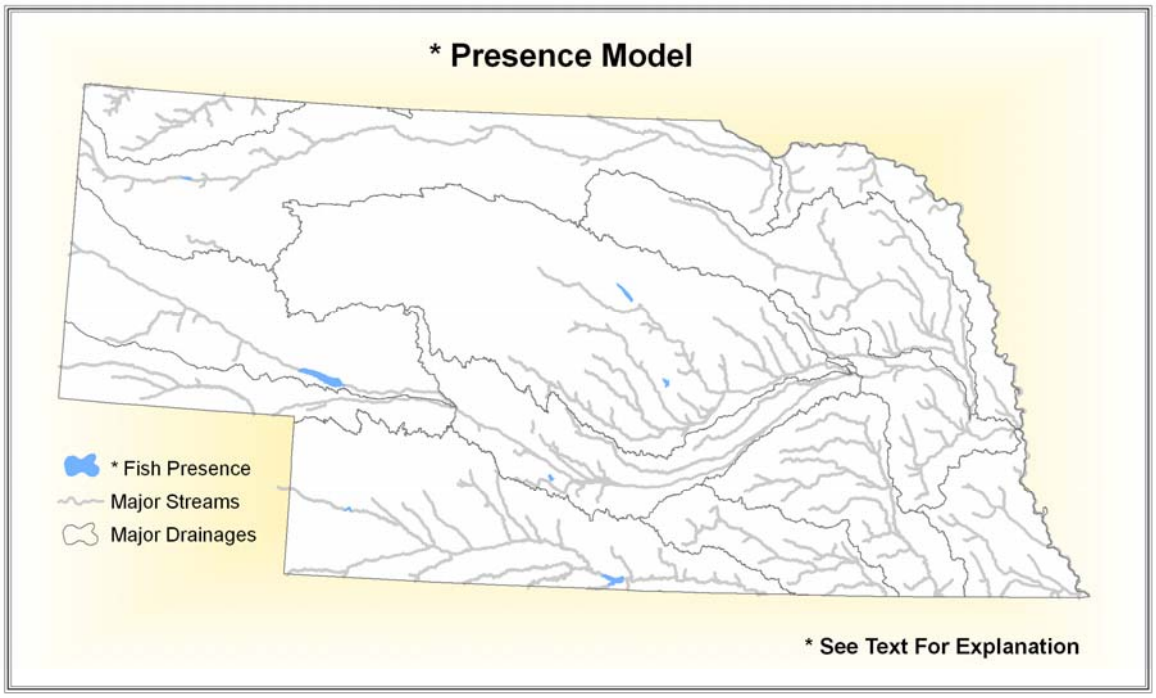
Rudd

Scardinius erythrophthalmus

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 163613
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

The rudd is largely a lake species in the state of Nebraska. These lakes include Enders Reservoir, Lake Ogallala, Lake McConaughty, Johnson Lake, Harlan County Reservoir, Sherman Reservoir, Calamus Reservoir, and Box Butte Reservoir.

Habitat Affinities:
The rudd inhabits still or slow backwaters and pools of sluggish streams, and the shallow edges of ponds and lakes. It is often associated with dense submergent vegetation where it deposits adhesive eggs (Pflieger, 1997; Crossman, 1992).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
N/A

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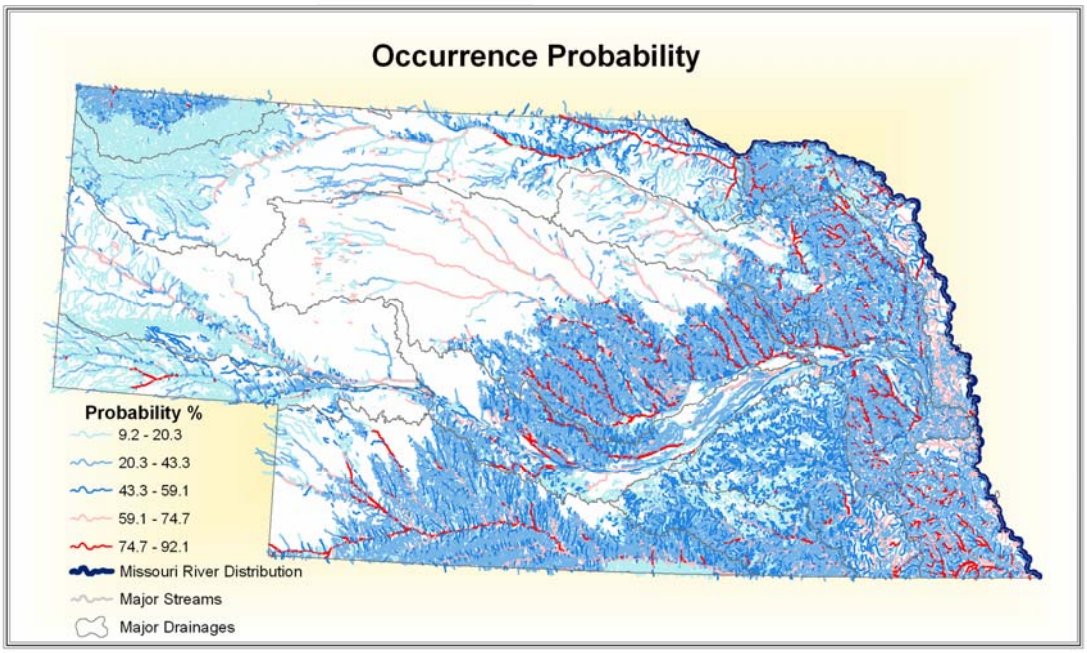
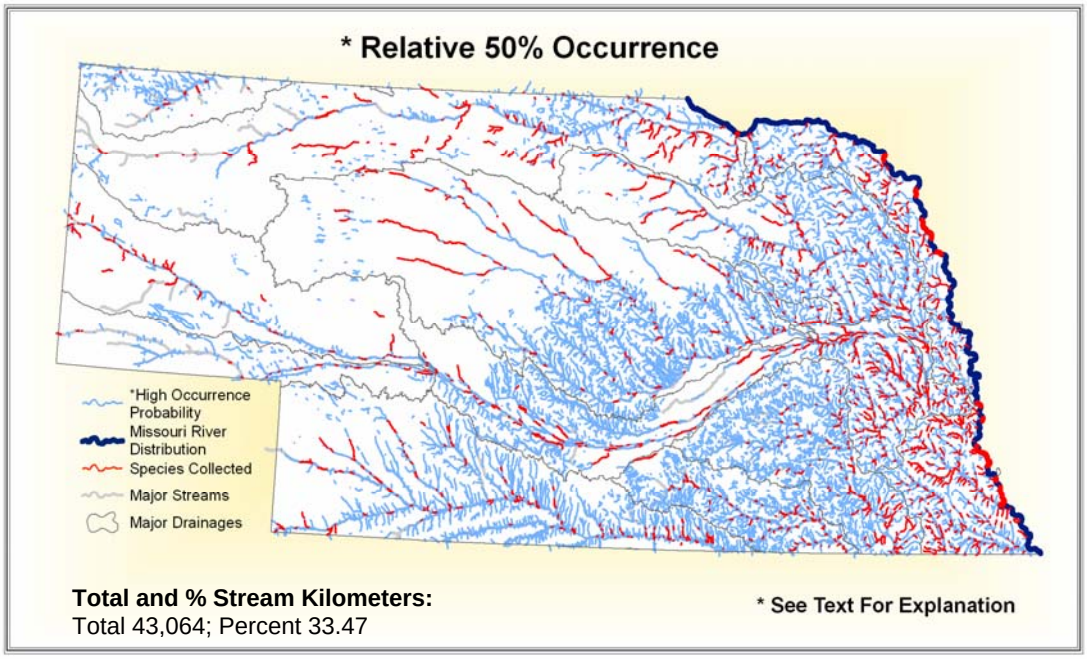
Sand Shiner

Notropis stramineus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163419
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 43,064; Percent 33.47

State Range:

The sand shiner is a relatively common species of the state of Nebraska and can be found across the entire state.

Habitat Affinities:

The sand shiner inhabits a wide variety of streams and rivers and can tolerate a wide range of turbidities, as well as some organic pollutants, provided they do not cover the bottom (Pflieger 1971; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). It is invariably found over clean sand or fine gravel within quiet to flowing, shallow pools (Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988). It occurs in all flowing waters, excepting the largest rivers, and is most abundant in the shallow pools of permanently flowing creeks and small rivers with moderate turbidity, low to moderate gradients and sand substrates (Pflieger 1997).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 10%
Commission: 21%
Overall: 69%

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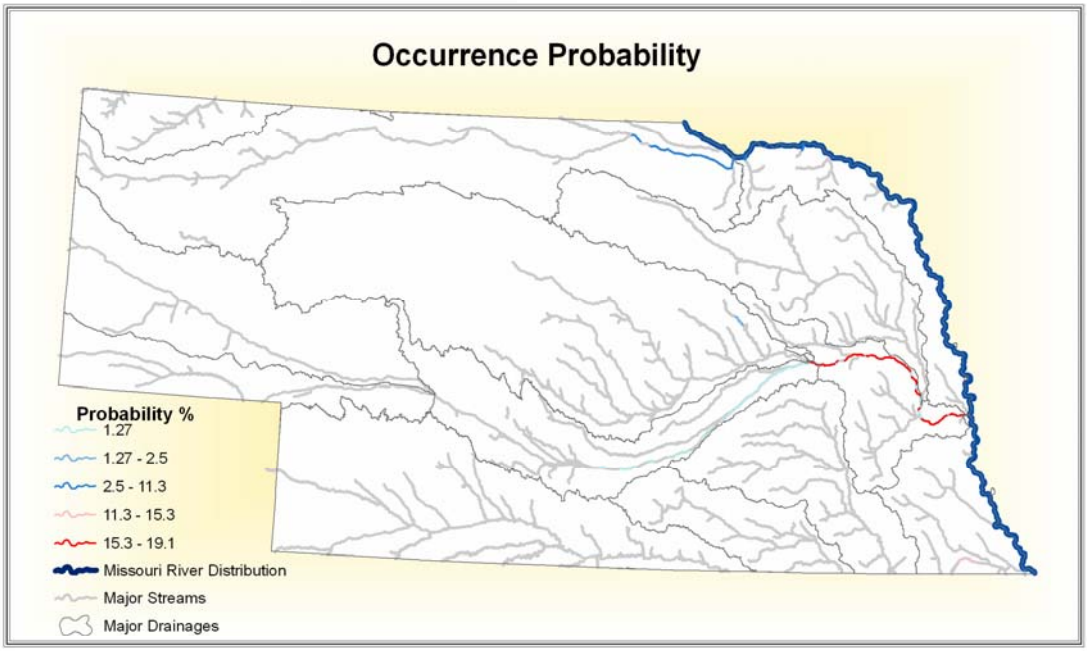
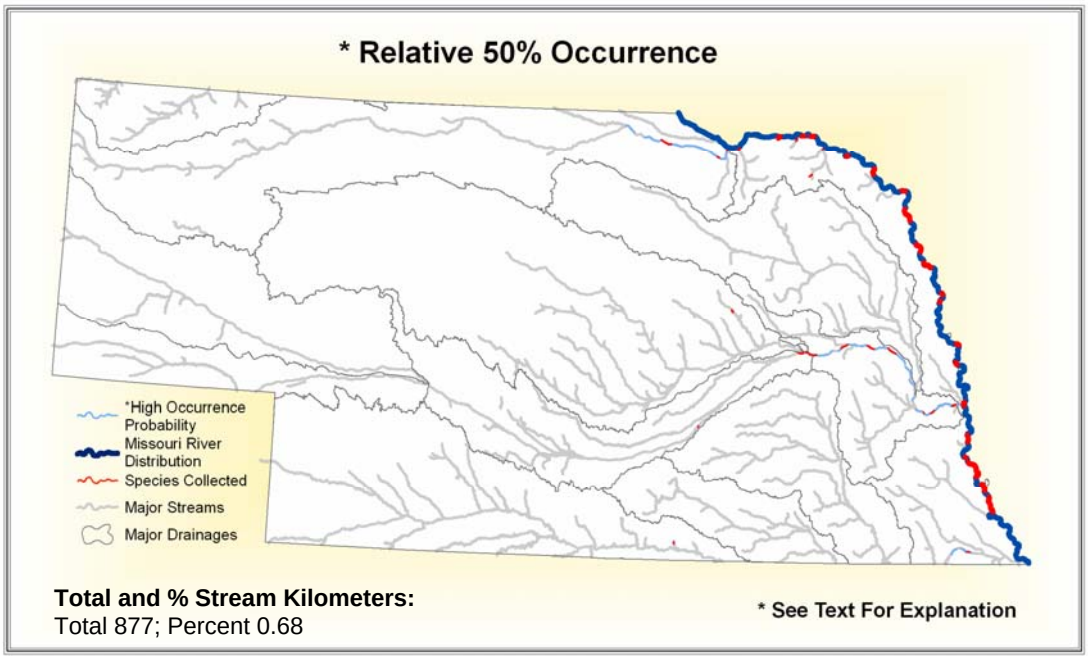
Sauger

Stizostedion canadense

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168509
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 877; Percent 0.68

State Range:

Sauger can be found in a few select areas in the state of Nebraska, primarily inhabiting the large rivers like the Missouri, Platte and lower portion of the Niobrara. The species can also be found in the lower Nemaha and in a few of the tributaries of the previously mentioned rivers.

Habitat Affinities:
The sauger mainly inhabits moderate to large, turbid rivers and the shallower areas of lakes (Cross and Collins 1975; Douglas 1974; Pflieger 1997; Robinson and Buchanan 1988; Phillips et. al. 1982; Trautman 1957), but it has also been successful in impoundments and reservoirs in some parts of its range (Clay 1975; Etnier and Starnes 1993). The sauger is often found in large, free-flowing streams near the ends of rock dikes with moderate to strong current over rocky substrates, and spawns over silt-free rip-rap (Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 3%
Overall: 97%

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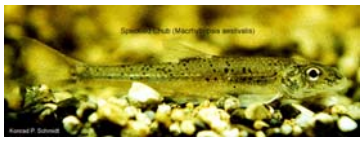
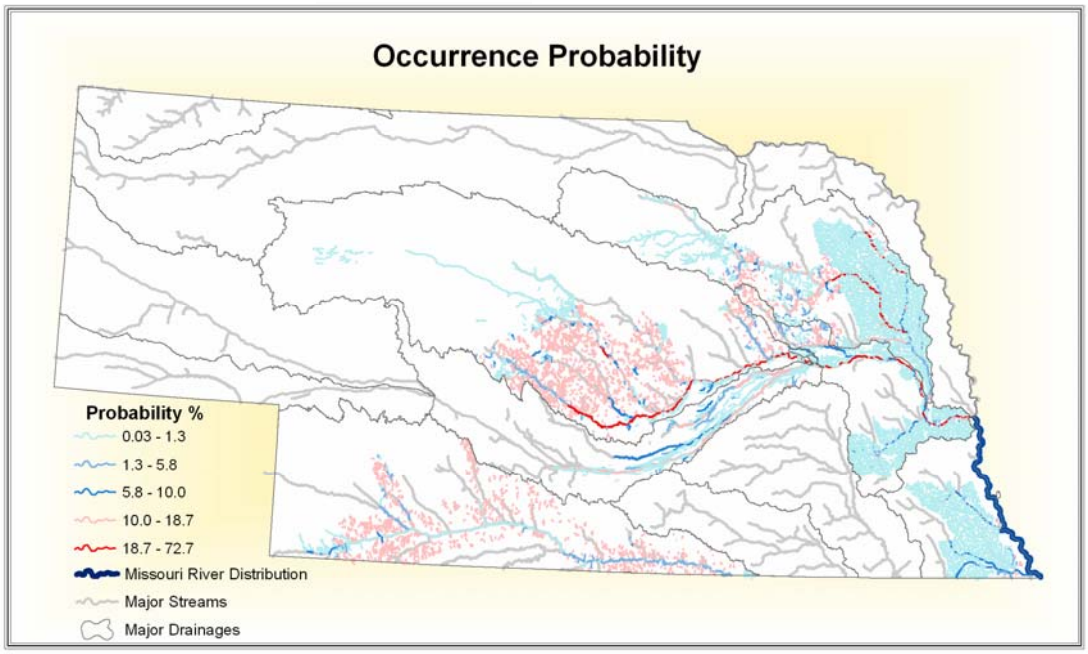


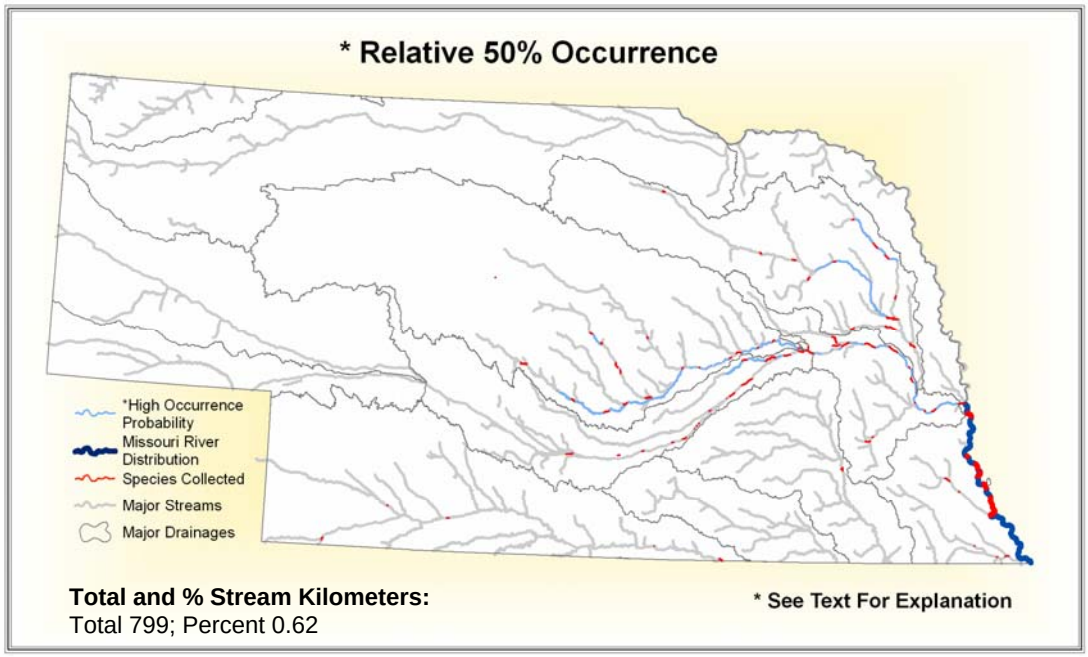
Shoal Chub

Macrhybopsis hyostoma

Native: Yes
State Rank: S4
Global Rank: G5

ITIS Code: 553280
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 799; Percent 0.62

State Range:

The shoal chub can generally be found in the eastern portion of Nebraska near the larger river systems. These rivers include the Missouri River south of the Platte River confluence, the Platte River, Loup River, Republican River, Elkhorn River and Nemaha River.

Habitat Affinities:
The shoal chub inhabits medium to large streams and large rivers with permanent flow and continuous high turbidity (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982). It feeds in shallow areas at night and is usually found in open channels with moderate to swift current, primarily over clean, fine sand, but also fine gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). Cross and Collins (1975) note that the shoal chub avoids sluggish waters and silted bottoms.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 2%
Commission: 2%
Overall: 96%

References:

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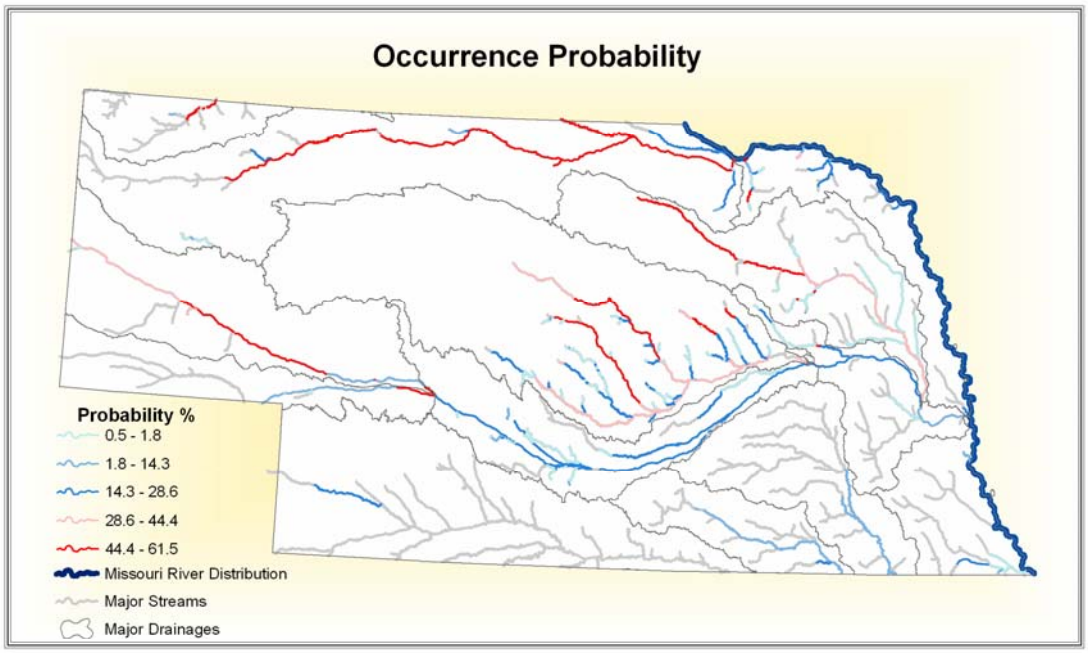
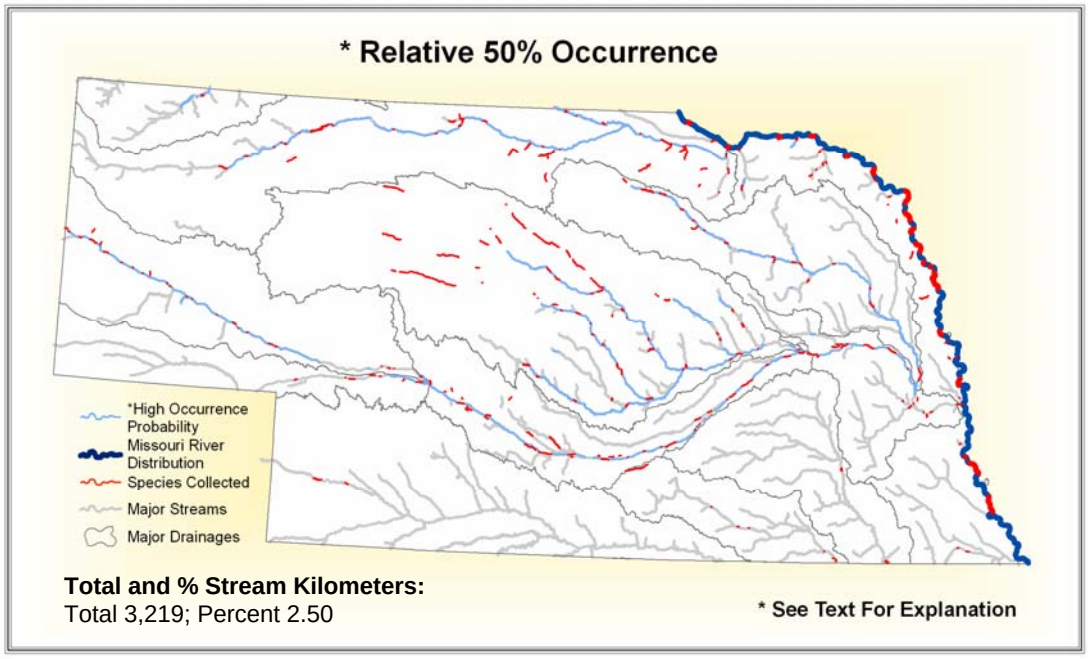
Shorthead Redhorse

Moxostoma macrolepidotum

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163928
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 3,219; Percent 2.50

State Range:

Shorthead redhorse can be found throughout the state of Nebraska, particularly in larger streams such as the Missouri, Little Blue, Niobrara, Platte, Elkhorn and Loup rivers. The species is also found in each of these river's tributaries as well. A few populations do occur elsewhere in the state near the Republican, upper White, lower Nemaha, and lower Big Blue rivers.

Habitat Affinities:

Over its entire range, the shorthead redhorse is adapted to a wide variety of habitats and is able to tolerate more turbidity than other redhorses (Phillips et. al. 1982; Robinson and Buchanan 1988), although populations tend to be smaller (Pflieger 1997; Trautman 1957). It is abundant in large streams and moderately large rivers (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988), but is also common in the clear, shallow waters of northern lakes (Phillips et. al. 1982; Trautman 1957), and occasionally inhabits the inflows of reservoirs (Etnier and Starnes 1993). The shorthead redhorse prefers moderate to swift currents, often adjacent to riffles, and silt-free substrates of gravel and rock, or mixtures of sand and gravel (Cross and Collins 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 5%
Commission: 6%
Overall: 89%

References:

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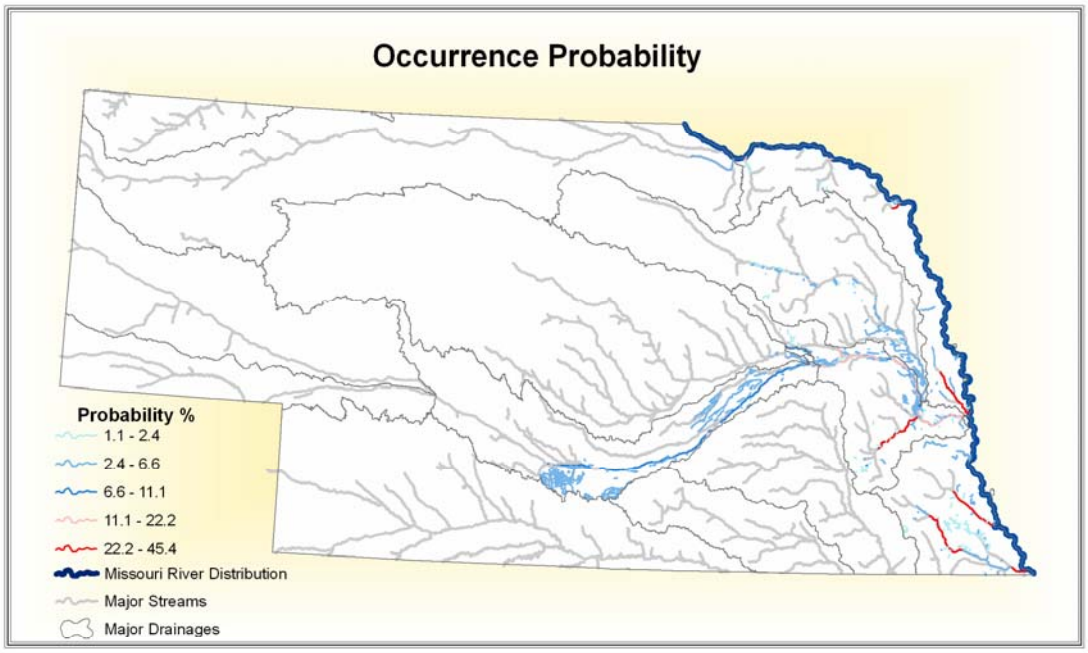
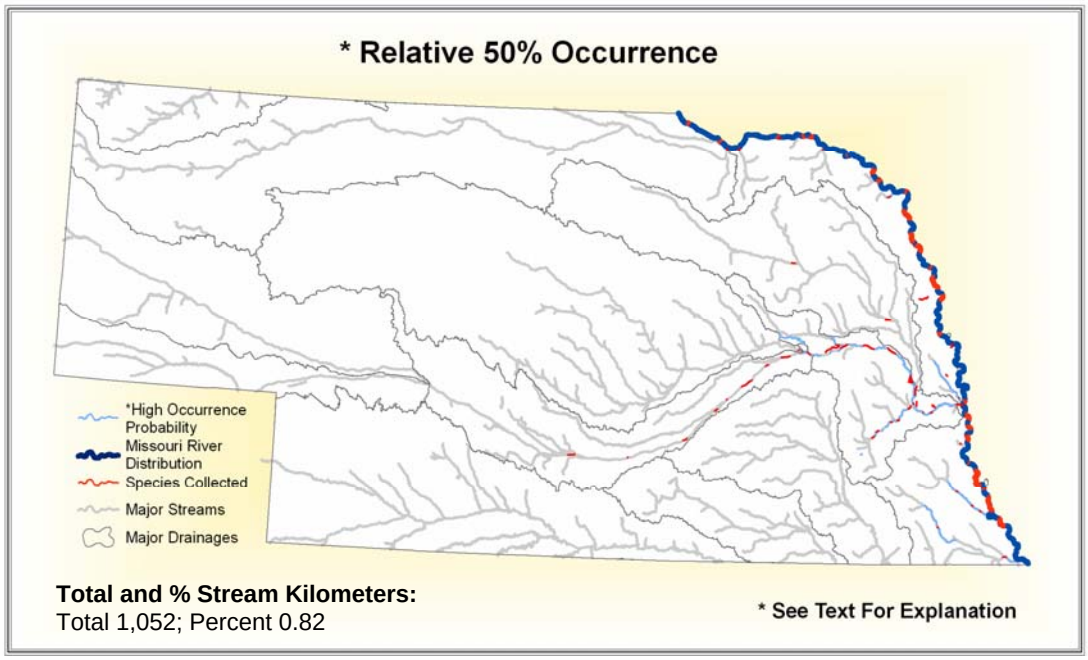
Shortnose Gar

Lepisosteus platostomus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161096
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,052; Percent 0.82

State Range:

Shortnose gar are located largely in the eastern half of Nebraska in and near large rivers. The range of the species includes the Missouri, Platte, lower Elkhorn, lower Niobrara, and lower Nemaha rivers, and a few of the streams that empty into the Missouri River.

Habitat Affinities:

The shortnose gar is found in lowland lakes, oxbows, quiet backwaters and overflow areas along large, low gradient rivers and streams (Douglas 1974; Phillips et. al. 1982; Robinson and Buchanan 1988; Etnier and Starnes 1993; Trautman 1957). However, in Kansas, Clay (1975) reports that it avoids backwaters, oxbows, and impoundments, which are more often inhabited by the spotted and longnose gars. The shortnose gar is abundant in clear, quiet pools with sand or mud bottoms (Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It tolerates higher siltation, turbidity and stronger current than other gars and is not as dependent on aquatic vegetation (Etnier and Starnes 1993; Pflieger 1997; Trautman 1957).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 1%
Commission: 4%
Overall: 96%

References:

Bailey, R. M., J. E. Fitch, E.S. Herald, E. A. Lachner, C. C. Lindsey, C.R. Robins, & W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada American Fisheries Society Special Publication No. 6. 149 pp.

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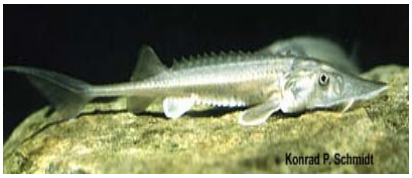
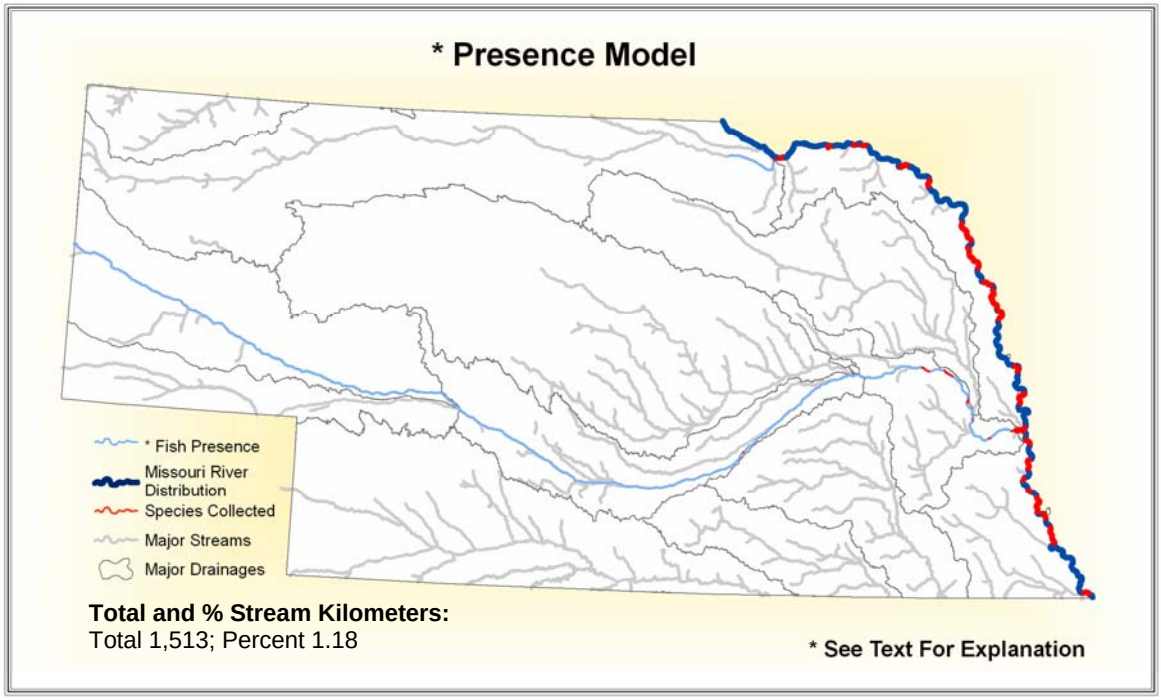


Shovelnose Sturgeon

Scaphirhynchus platorynchus

Native: Yes
State Rank: S?
Global Rank: G4

ITIS Code: 161082
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Shovelnose sturgeon can be found in the Platte and Missouri Rivers, and the lower section of the Niobrara River. The North Platte River and the middle portion of the Platte River are included as historical distributions.

Habitat Affinities:
The shovelnose sturgeon inhabits the open flowing channels of large rivers with moderate to strong currents and clean sandy or gravelly bottoms (Douglas 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). It feeds over deep chutes or shallow bars and can tolerate high turbidity (Robinson and Buchanan 1988; Trautman 1957; Pflieger 1997). Impoundments are a major threat to the shovelnose sturgeon as they block access to spawning grounds (Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 7%
Overall: 93%

References:

Bailey, R. M., J. E. Fitch, E.S. Herald, E. A. Lachner, C. C. Lindsey, C.R. Robins, & W. B. Scott. 1970. A list of common and scientific names of fishes from the United States and Canada American Fisheries Society Special Publication No. 6. 149 pp.

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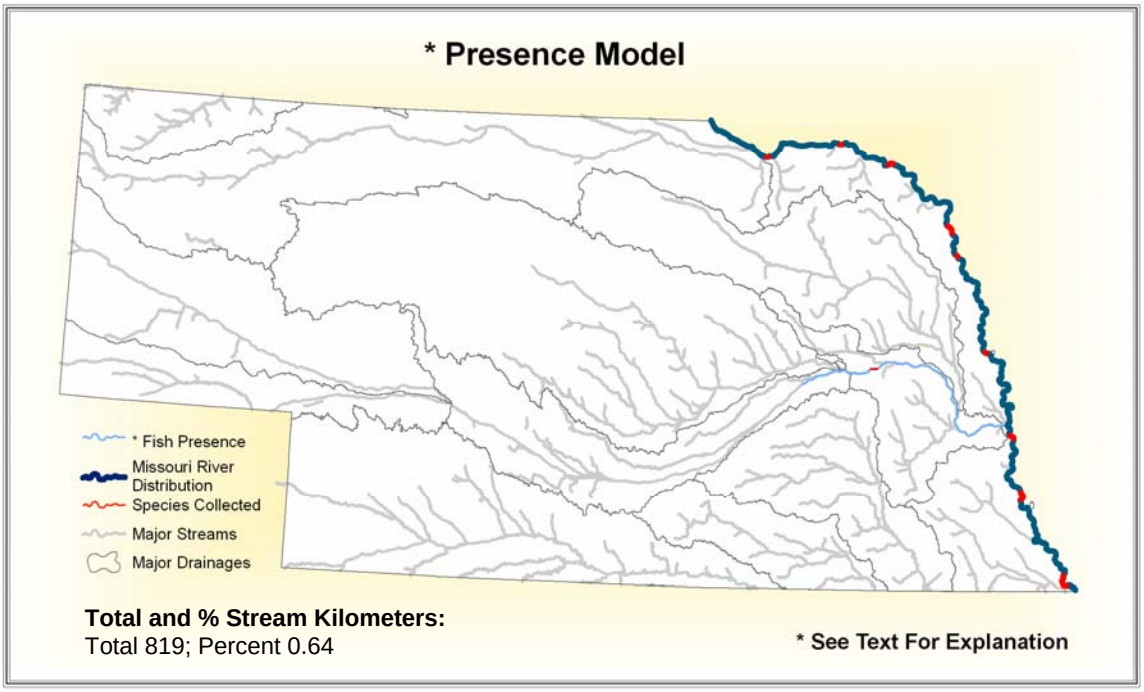
Sicklefin Chub

Macrhybopsis meeki

Native: Yes
State Rank: S3
Global Rank: G3

ITIS Code: 163868
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Sicklefin chub are found in the Missouri River, and in the mainstem of the lower portion of the Platte River.

Habitat Affinities:
The sicklefin chub is found in the deep, swift waters of large, warm, turbid rivers with firm substrates of smooth sand or fine gravel (Cross and Collins 1975; Pflieger 1997; Smith 1979). The sicklefin chub spawns in flowing waters with rocky substrates.

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

References:

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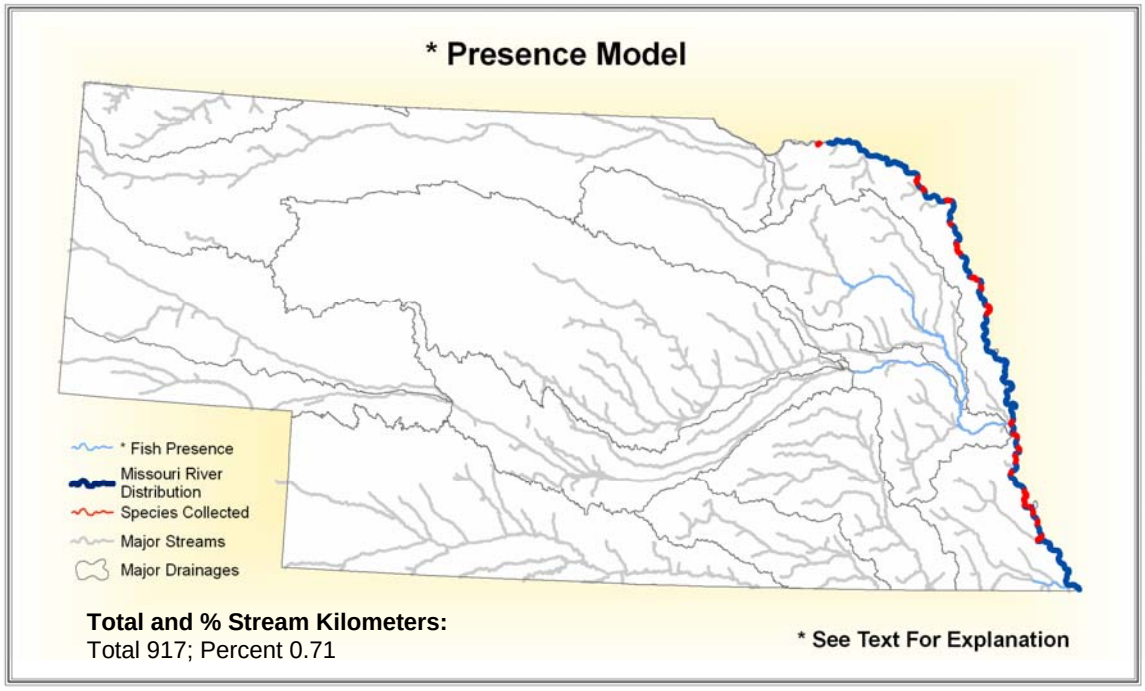
Silver Carp

Hypophthalmichthys molitrix

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 163691
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Silver carp are mainly a large river species and are generally found in the eastern portion of the state. They are located in the Missouri River and many of its tributaries below Gavin's Point Dam. It is also found in the lower Elkhorn and Nemaha rivers.

Habitat Affinities:
The silver carp is native to the large rivers of eastern China and has adapted to lakes and reservoirs as well as large rivers and tributaries in the United States (Etnier and Starnes 1993; Freeze and Henderson 1982; Pflieger 1997). The silver carp moves about in the pelagic zone feeding on phytoplankton by filtering it through spongelike gill apparatus (Etnier and Starnes 1993; Freeze and Henderson 1982; Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
N/A

References:

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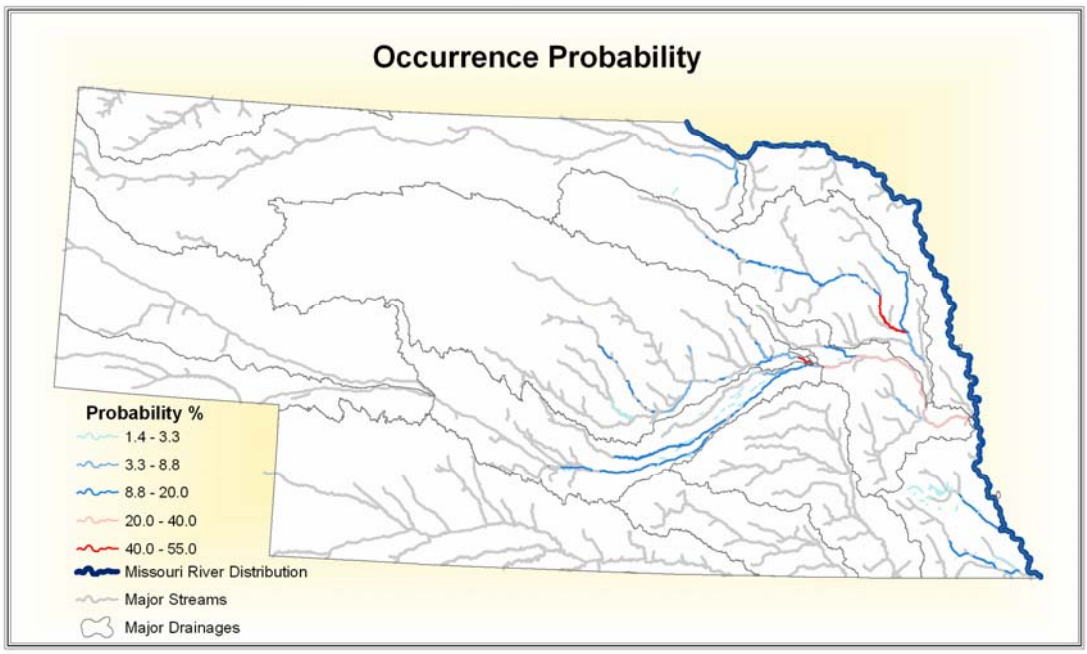
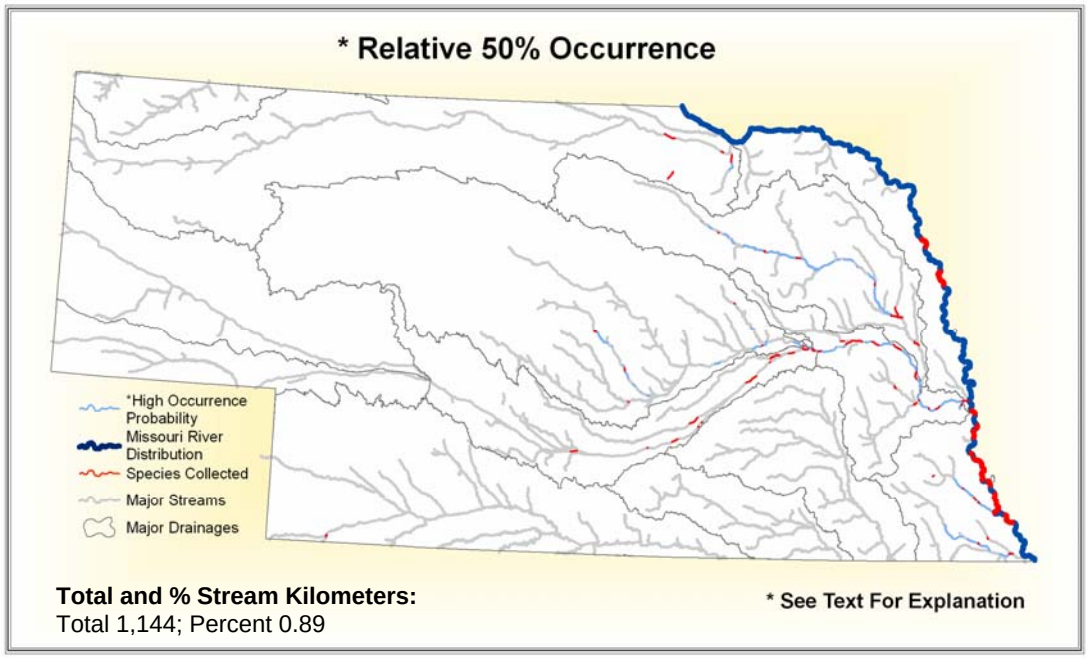
Silver Chub

Macrhybopsis storeriana

Native: Yes
State Rank: S3
Global Rank: G5

ITIS Code: 163870
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 1,144; Percent 0.89

State Range:

Silver chub can be found in a few areas in the eastern portion of the state, mainly located in large rivers or their immediate tributaries. Some of these areas include the Missouri, lower Niobrara, Elkhorn, Platte, Loup and Nemaha rivers.

Habitat Affinities:
The silver chub inhabits lakes and large, low-gradient streams and rivers, where it prefers the deeper parts of the mainstem during the day, making it difficult to capture (Cross and Collins 1975; Clay 1975; Robinson and Buchanan 1988; Etnier and Starnes 1993). The silver chub is much easier to collect after dusk, as it migrates to shallow areas by the shoreline to feed on insects and other small invertebrates (Clay 1975; Robinson and Buchanan 1988). Some investigators note that this pool species is quite tolerant of silty, turbid streams and rivers (Clay 1975; Robinson and Buchanan 1988) but Trautman (1957) found that, in extremely turbid or silty areas, it resorted to riffles or clearer, high gradient tributaries. The silver chub prefers moderate to swift current and silty, sandy or gravelly substrates (Clay 1975; Cross and Collins 1975; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 4%
Overall: 95%

References:

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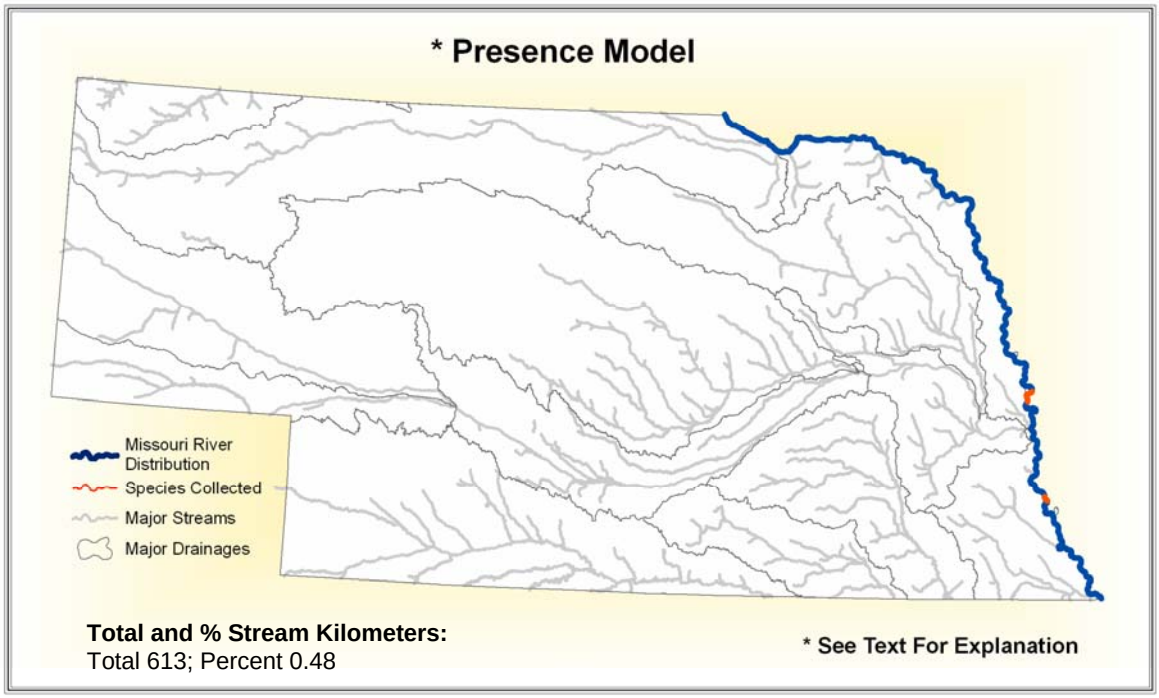
Silver Lamprey

Ichthyomyzon unicuspis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 159730
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

In Nebraska, silver lamprey are found in the Missouri River. Occasionally a silver lamprey can be found venturing up one of the Missouri's tributaries.

Habitat Affinities:

The silver lamprey is mainly a northern species, inhabiting large streams, rivers and lakes (Eddy and Underhill 1974; Phillips et. al. 1982). The silver lamprey migrates into smaller streams and constructs nests in sandy and gravelly riffles to deposit larvae, which remain in these areas for early development. Adults drift into larger waters and prefer clean, clear water with bottoms of sand, gravel and organic debris, completely free of silt and pollutants (Pflieger 1997; Trautman 1957). The silver lamprey can be found in some large rivers of Tennessee and Kentucky, as well as Lake Erie in Ohio (Clay 1975; Etnier and Starnes 1993; Trautman 1957).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Presence Model:

Omission: 0%
Commission: 4%
Overall: 96%

References:

Becker, G. C. 1983. Fishes of Wisconsin. University of Wisconsin Press, Madison. 1052 pp.

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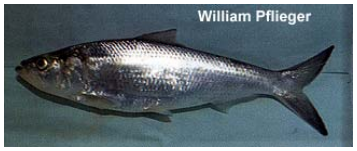
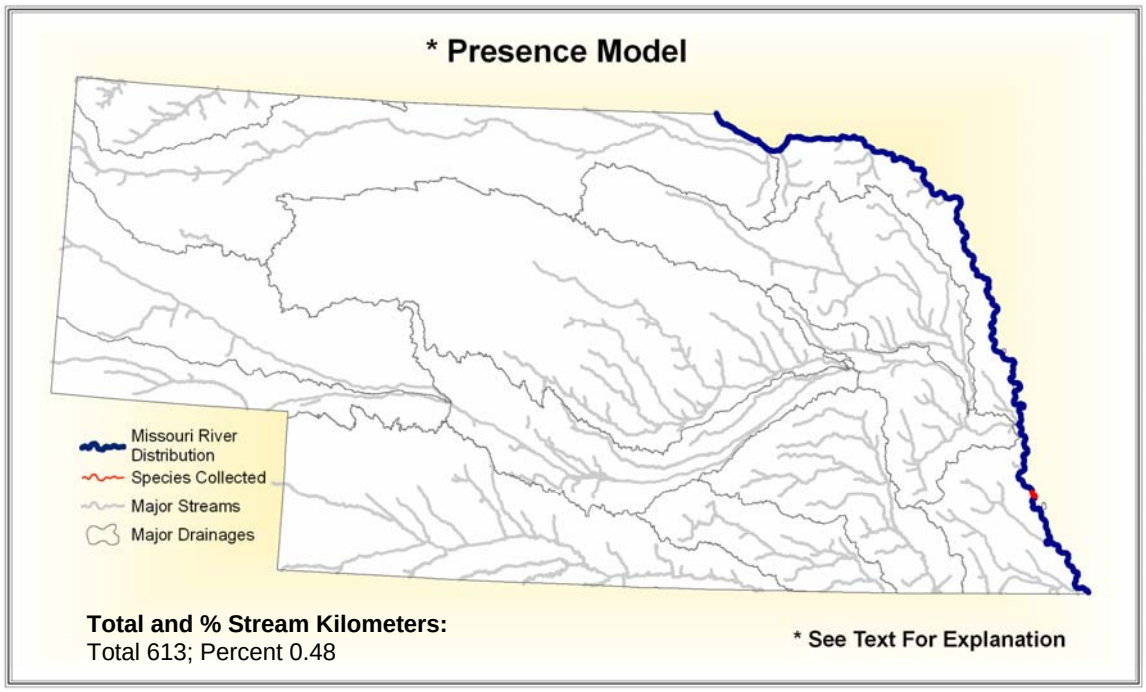


Skipjack Herring

Alosa chrysochloris

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 161707
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

In Nebraska, skipjack herring are found in the Missouri River.

Habitat Affinities:
The skipjack herring is highly migratory and mainly inhabitants large rivers, but is also found in backwaters and main channel reservoirs (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). The skipjack herring cannot tolerate high turbidity and where dams impede upstream migration large numbers aggregate in the swift waters below (Clay 1975; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). As in other states, it congregates in the swift waters below dams that are blocking movement (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 4%
Overall: 96%

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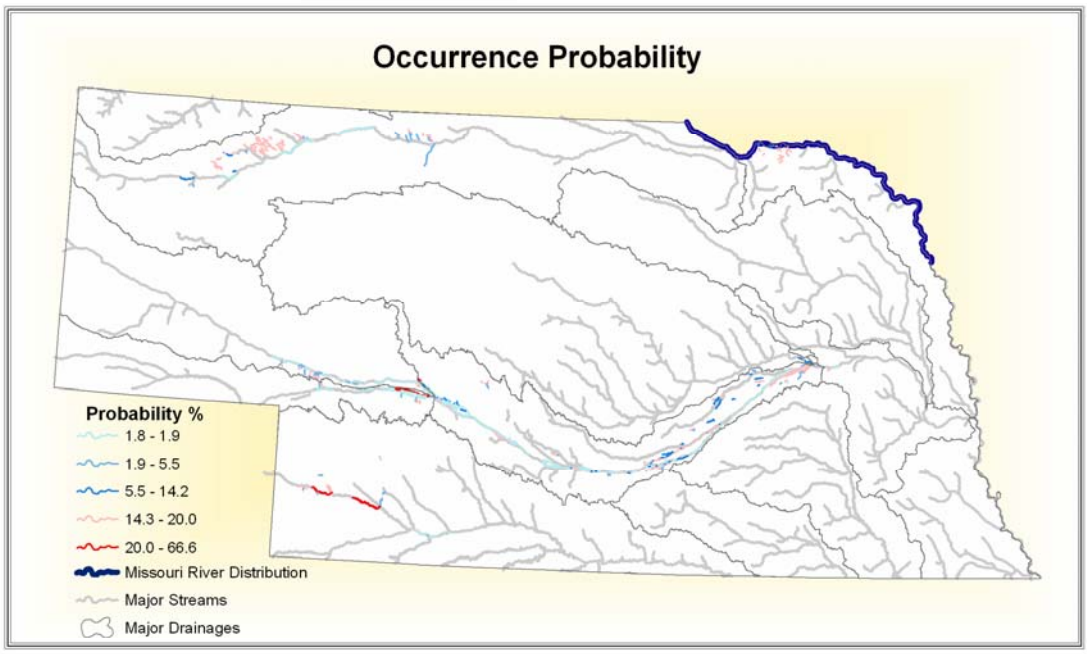
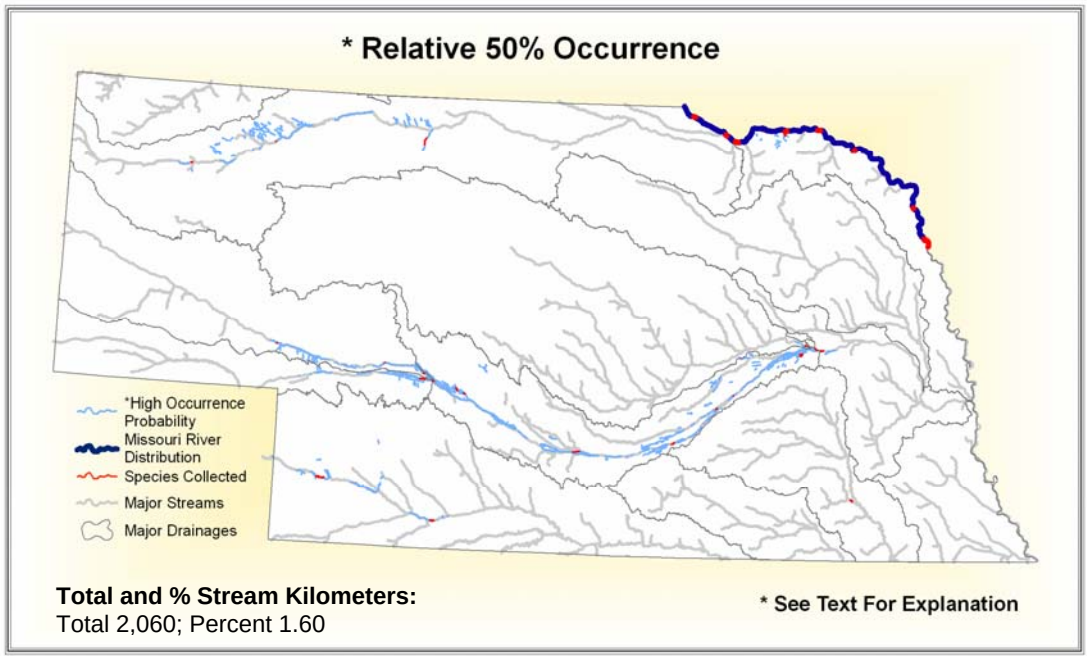
Smallmouth Bass

Micropterus dolomieu

Native: No
State Rank: S?
Global Rank: G5

ITIS Code: 550562
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,060; Percent 1.60

State Range:

Populations of smallmouth bass are scattered across the state of Nebraska. They are known to be in the Missouri River north of Blackbird Creek. The species can also be found in and around the North Platte and Platte rivers, a few places along the upper Niobrara River and a few areas along the upper Republican River.

Habitat Affinities:

The smallmouth bass inhabits clear, cool and swift flowing upland creeks, mountain streams, large rivers and medium-sized lakes with clean gravelly or rocky bottoms and permanent flow (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). It is occasionally found in large reservoirs having clear, deep water and a well-developed, oxygenated hypolimnion (Pflieger 1997; Robinson and Buchanan 1988). The smallmouth bass is associated with pools just below riffles with various forms of cover, such as undercut banks, boulders, logs, stumps, and fallen trees (Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988). The smallmouth bass is intolerant of high siltation and turbidity and has been eliminated for miles below dams, as it cannot tolerate cold tailwaters (Robinson and Buchanan 1988).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 0%
Commission: 4%
Overall: 96%

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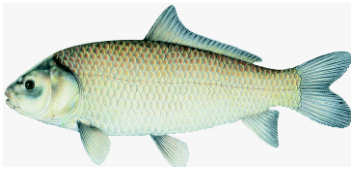
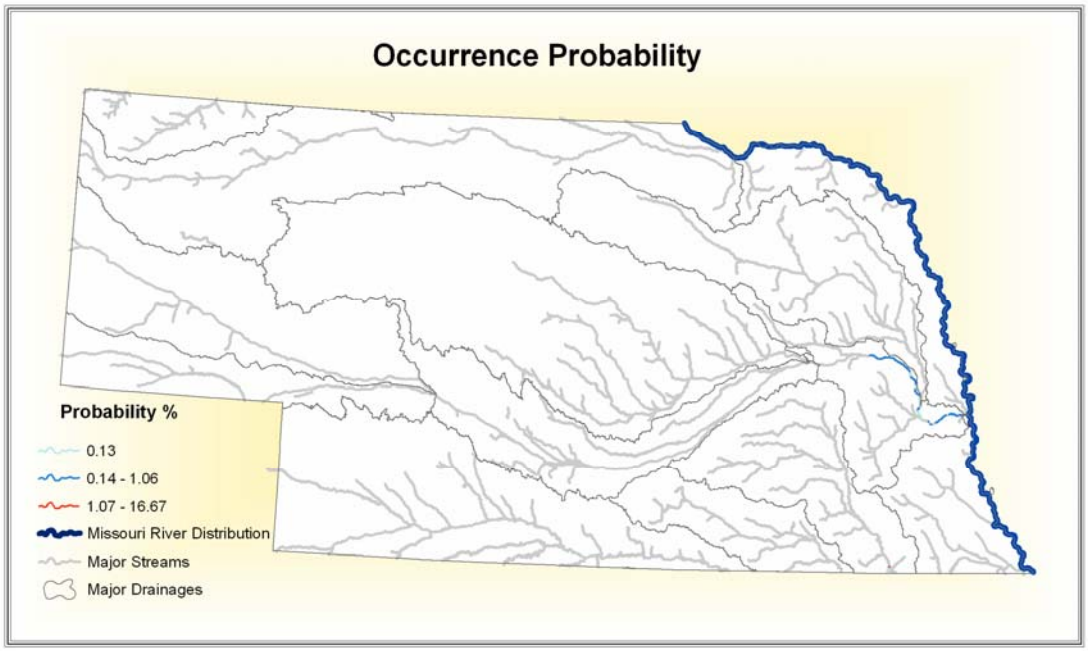
Smallmouth Buffalo

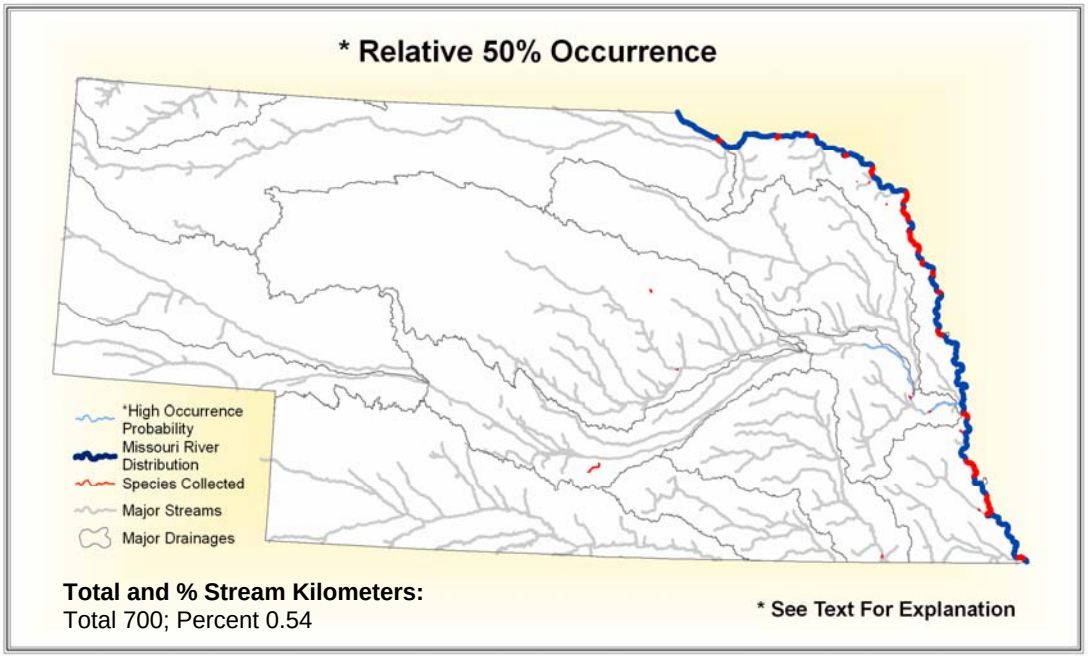
Ictiobus bubalus



Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163955
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 700; Percent 0.54

State Range:

Smallmouth buffalo are located in a few areas in the eastern portion of the state. They can be found in the Missouri River and some of the small streams that drain into it, and in the lower Platte River.

Habitat Affinities:
The smallmouth buffalo inhabits the deep pools of streams, large rivers, backwaters in the mouths of tributaries and oxbows. It is associated with moderate current, rocky bottoms, clear water and debris, such as "deadfalls" or log drifts (Cross and Collins 1975; Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 3%
Overall: 97%

References:

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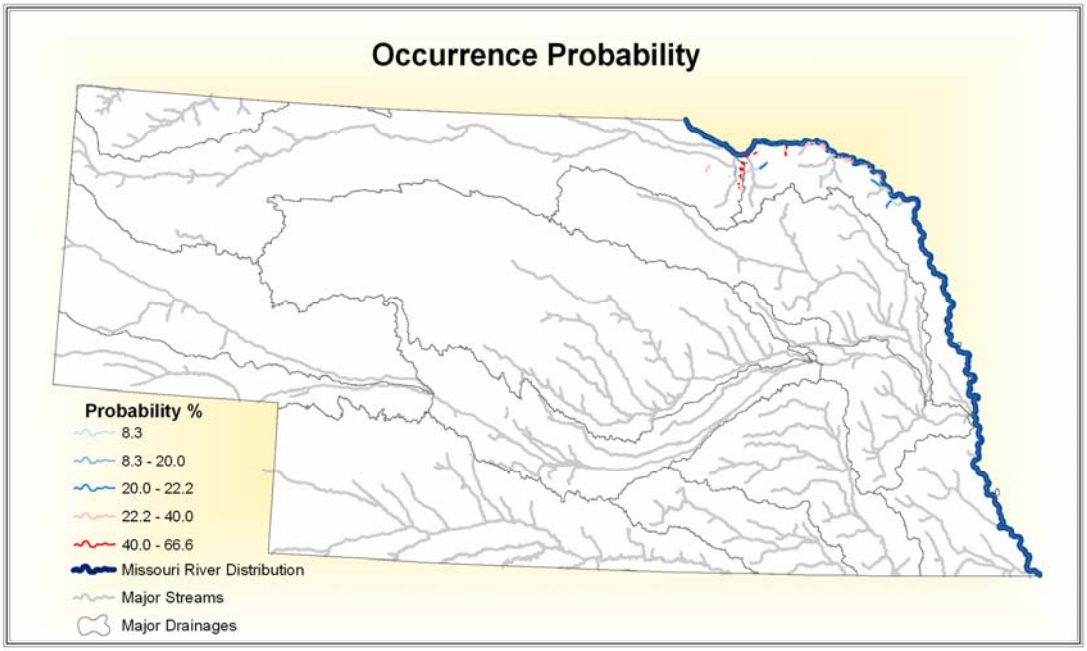
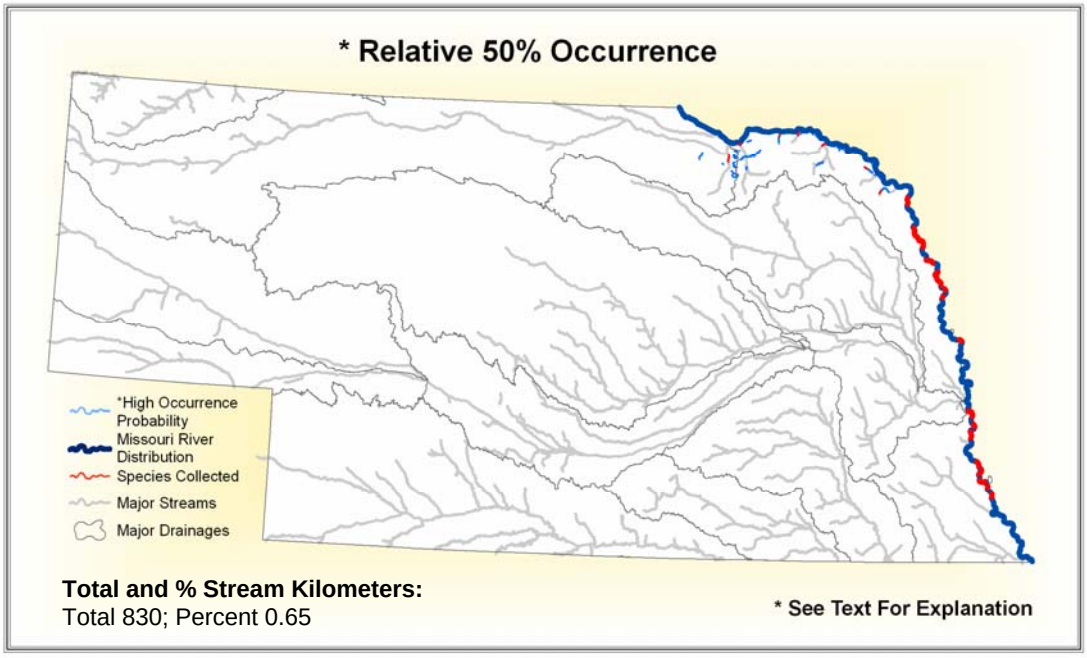
Spotfin Shiner

Cyprinella spiloptera

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163803
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Spotfin shiner are found throughout the Missouri River, and in some of its tributaries in the northeastern portion of the state. They can be found in the lower Niobrara River.

Habitat Affinities:
The spotfin shiner inhabits an impressive range of habitats, as evidenced by the descriptions from various regions. In Ohio, it reaches greatest abundance in low gradient streams with submergent vegetation (Trautman 1957). In the Spring River drainage of Kansas, it prefers the edges of clean gravelly bars with moderate current (Cross and Collins 1975). In the northern U.S., it prefers large rivers in areas overlying sandy-silt (Eddy and Underhill 1974). In Missouri, the spotfin shiner has much the same habitat as the steelcolor shiner: large, clear upland rivers with moderate to high gradient and permanent flow. However, the spotfin shiner is more often found in large streams. Its microhabitat consists of vegetated pools with moderate current below rocky and gravelly riffles (Pflieger 1997). The spotfin shiner is able to withstand considerable turbidity, siltation, and pollution (Pflieger 1997; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 3%
Overall: 97%

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Spottail Shiner

Notropis hudsonius

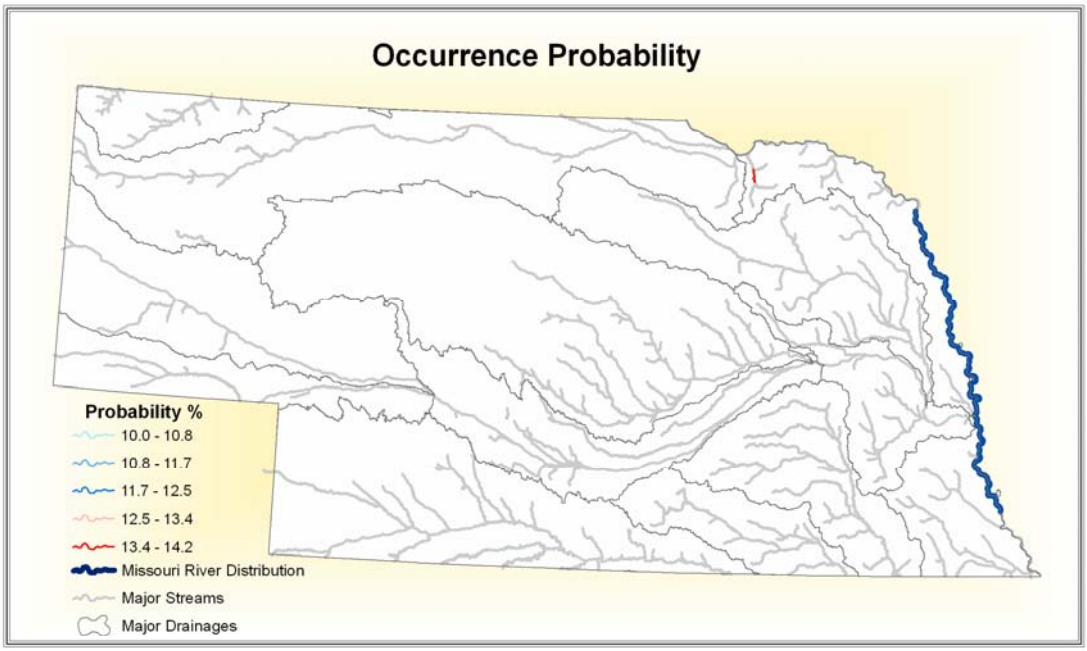
ITIS Code: 163404

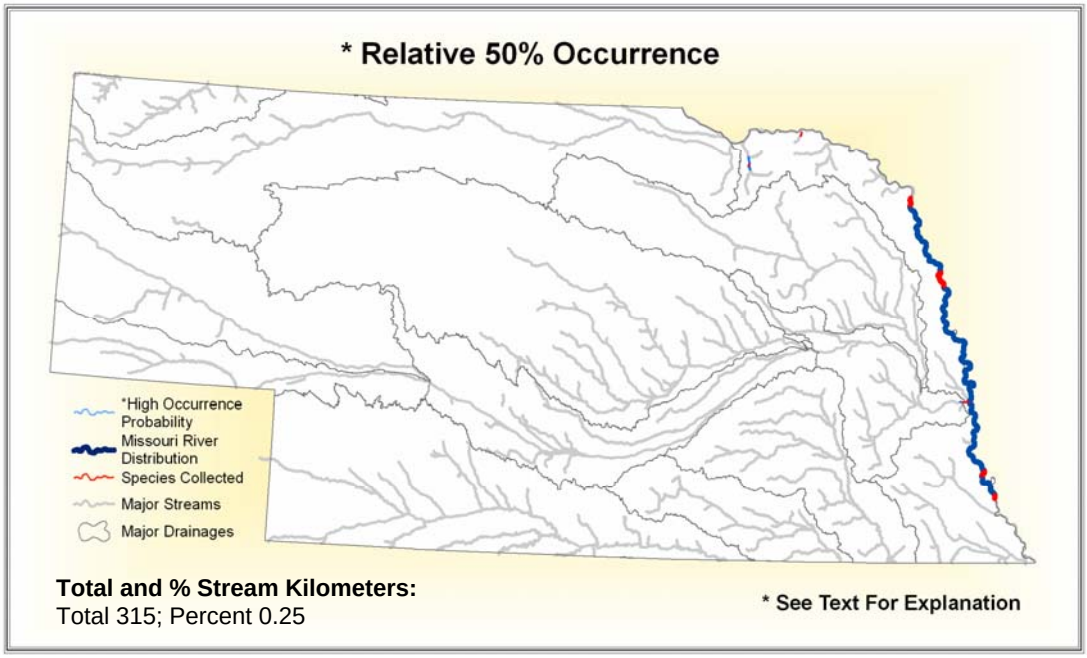
Native: No

State Rank: S?

Global Rank: G5

Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 315; Percent 0.25

State Range:

Spottail shiner can be found in the Missouri River from just above South Omaha Creek in the north to just above the Little Nemaha River in the south, and in Bazile Creek, a tributary of the Missouri River, in northeastern Nebraska.

Habitat Affinities:
The spottail shiner is most often found in northern lakes and large rivers (Eddy and Underhill 1974; Phillips et. al. 1982). It is found over substrates of sand or gravel and reaches depths of up to 60 ft in Lake Erie (Trautman 1957). In the Mississippi River of Missouri, the spottail shiner inhabits sluggish areas with firm substrates of sand, gravel or rubble and moderately clear water (Pflieger 1971; Pflieger 1997). The spottail shiner has declined in many areas from silted bottoms and excessively turbid or polluted waters from industry and agriculture (Eddy and Underhill 1974; Phillips et. al. 1982; Trautman 1957).

Modeled Affinities:
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 2%
Overall: 98%

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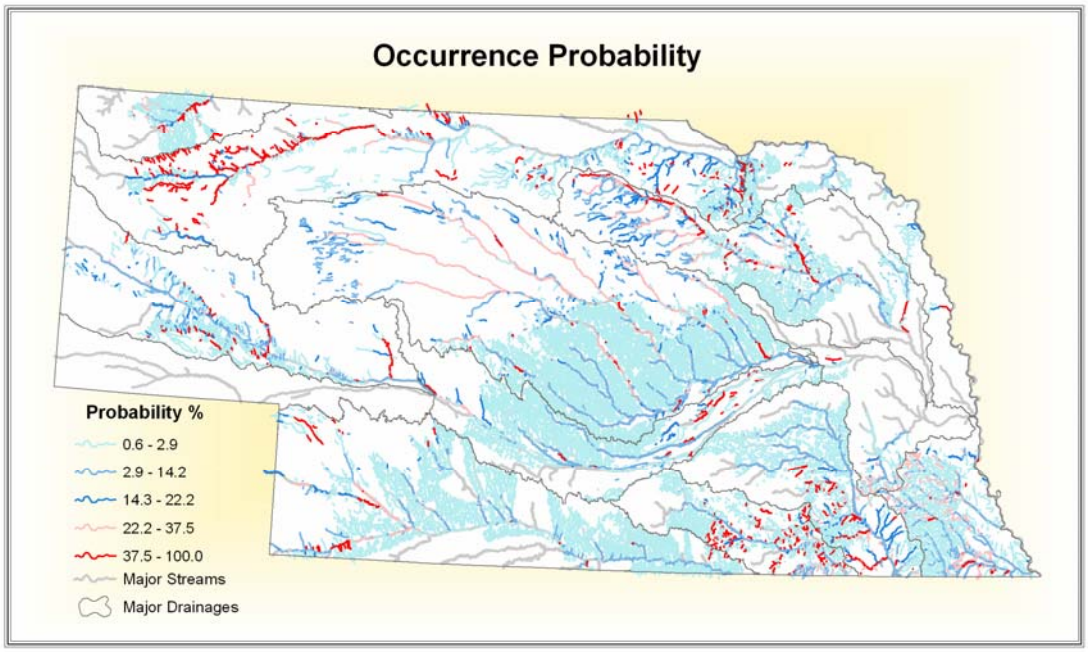
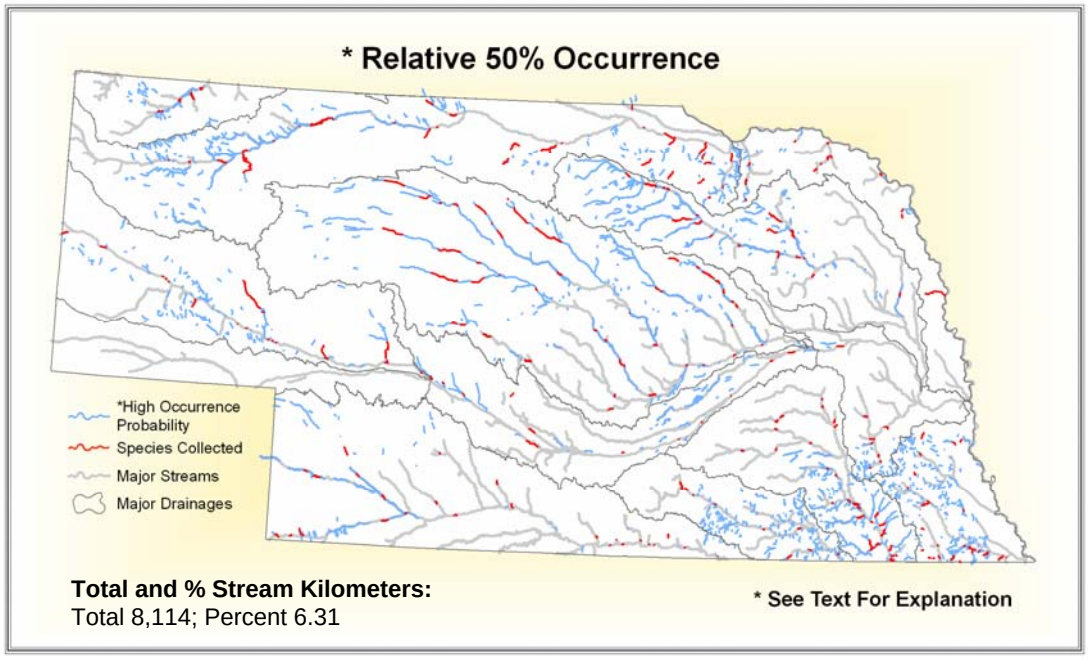
Stonecat

Noturus flavus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164013
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 8,114; Percent 6.31

State Range:

Stonecat populations can be found throughout the state. Stonecat can be found in the Loup and Nemaha River drainages; the upper Elkhorn River; the Big and Little Blue rivers; and along the Niobrara, Republican and Platte Rivers.

Habitat Affinities:

The stonecat appears in varied clearwater stream types, from moderate-sized, warm water creeks to larger streams (Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982). However, it avoids areas with extremely high gradient, as well as those with intermittent flow, and occurs only sparingly in low-gradient sluggish streams (Pflieger 1997; Trautman 1957). The stonecat is primarily found in higher gradient habitats, where it is found in riffles or runs with gravel, boulder and bedrock substrates (Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957). In large, low-gradient streams, it requires bottoms free of silt or other pollutants, and it can also be found along the beaches of Lake Erie, where currents mimic stream-like conditions (Trautman 1957). In the Missouri River, the stonecat inhabits swift channels with sand bottoms (Pflieger 1997). In Minnesota, stonecat are sometimes found concentrated just below dams on streams or rivers (Phillips et. al. 1982). During the daylight hours, the stonecat can be found hiding beneath slabs of shale or limestone, in rock crevices or in woody debris on the stream bottom (Cross and Collins 1975; Eddy and Underhill 1974; Phillips et. al. 1982). The insect, crayfish, and forage fish populations must be high to support the stonecat population (Pflieger 1997; Trautman 1957).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 5%
Commission: 8%
Overall: 87%

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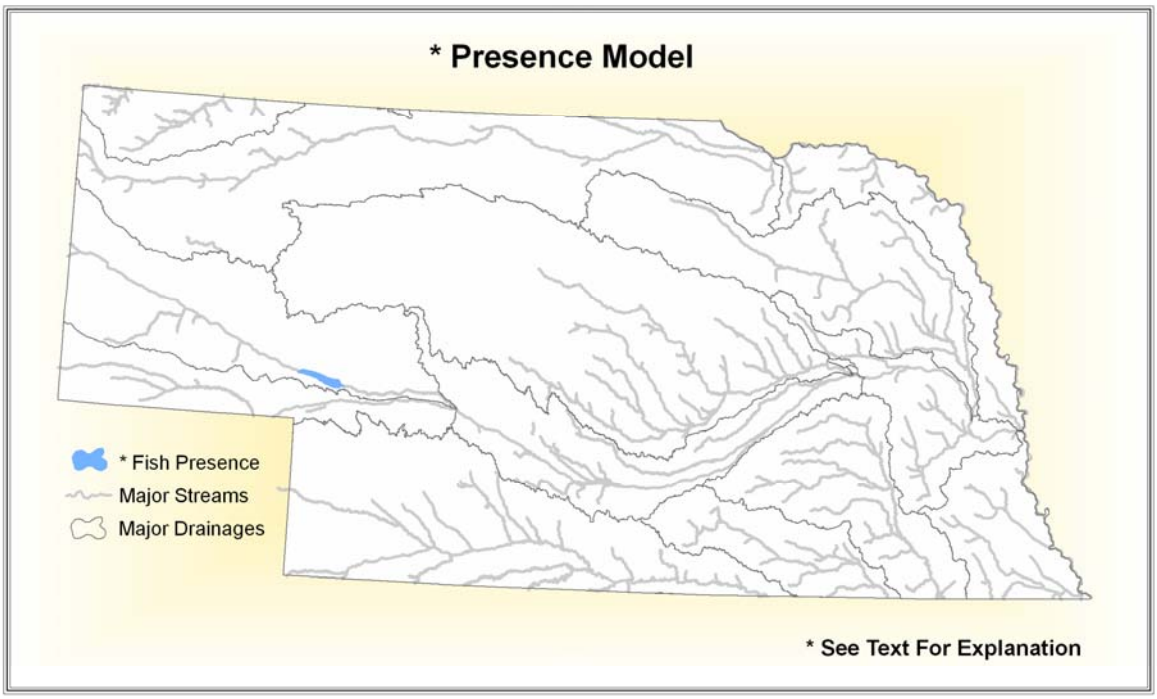
Striped Bass

Morone saxatilis

Native: No
State Rank: SE
Global Rank: G5

ITIS Code: 167680
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Striped bass are found in Lake McConaughty in western Nebraska.

Habitat Affinities:
The marine habitat of the striped bass includes shores, bays, and estuaries along the Atlantic and Pacific Coasts. Marine populations ascend the lower parts of rivers to spawn in strong current, sometimes reaching as far as 100 miles inland (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). Inland populations are maintained by stocking in most states (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988), but self-sustaining landlocked populations were discovered in North Carolina and used in stocking operations in some areas, including Missouri (Pflieger 1997).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
N/A

References:

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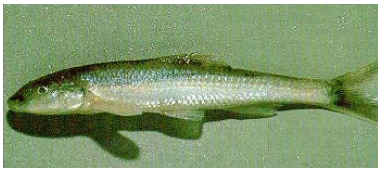
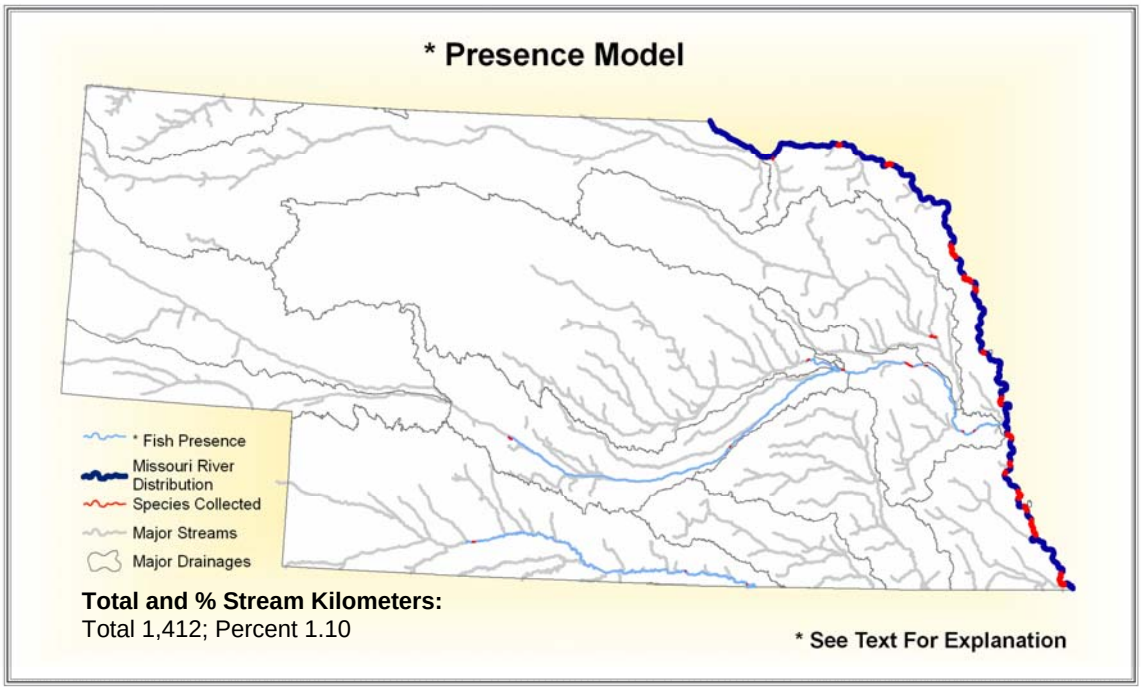


Sturgeon Chub

Macrhybopsis gelida

Native: Yes
State Rank: S3
Global Rank: G3

ITIS Code: 163866
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Sturgeon chub can be found throughout the Missouri River, and in the mainstem of the Platte, Republican and lower Elkhorn Rivers.

Habitat Affinities:
The sturgeon chub inhabits the warm, continuously turbid waters of large perennial streams and rivers. They are found in association with moderate to strong current over sand and more often gravel substrate (Etnier and Starnes 1993; Robinson and Buchanan 1988; Pflieger 1997; Pflieger 1971). The sturgeon chub is restricted primarily to the main channels of the Missouri and Mississippi Rivers and their more sizeable tributaries. In the Missouri River, collections have been made where strong current flows over wide sand bars. The Mississippi River collections were made where steep banks were associated with fine gravel and sand patches in medium to fast current (Etnier and Starnes 1993). In Kansas populations have been found where the channel splits at the heads of islands and shallow sandy areas occur (Cross and Collins 1975).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 6%
Overall: 93%

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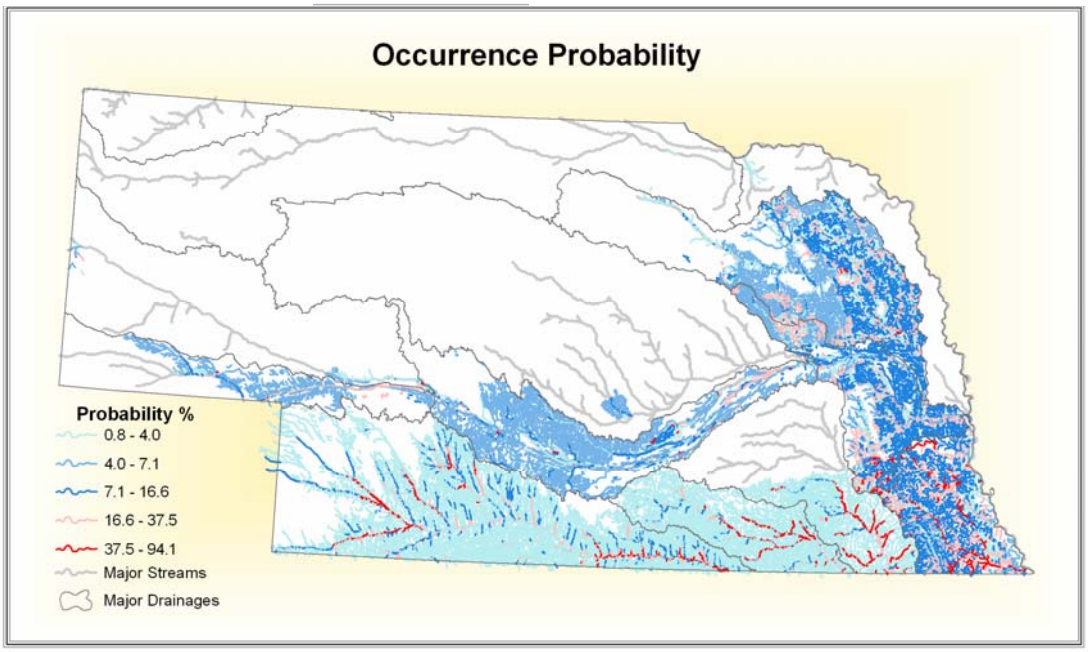
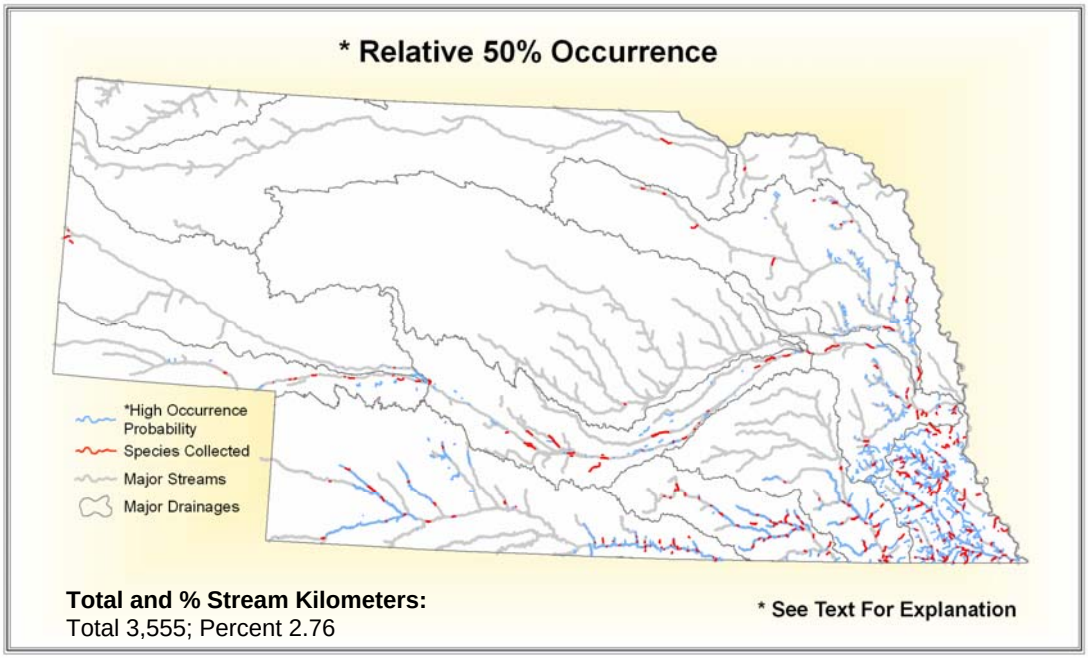
Suckermouth Minnow

Phenacobius mirabilis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163502
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

Suckermouth minnow are generally located in the southern and eastern portions of Nebraska. Suckermouth minnow can be found in much of the Platte and South Platte River drainages; in much of the Elkhorn River drainage; and throughout the Republican, Nemaha, Little Blue and Big Blue River drainages.

Habitat Affinities:

The suckermouth minnow is primarily a riffle fish, though not restricted to areas of swift current, inhabiting perennial streams of sufficient gradient to keep the bottoms silt-free (Pflieger 1997; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993). It occurs over substrates ranging from small rubble to sand and in streams of all sizes. While researchers agree that this minnow is tolerant of high turbidity, some find higher populations in clearer waters (Pflieger 1997; Robinson and Buchanan 1988) and others indicate low numbers or a complete absence in clear waters (Trautman 1957). It is more tolerant of changes in water level than other riffle species (Cross and Collins 1975). The suckermouth is intolerant of high gradient streams, those kept constantly cold from springs, intermittent flow, and competition from other small riffle fish (Trautman 1957; Pflieger 1997).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 5%
Commission: 7%
Overall: 88%

References:

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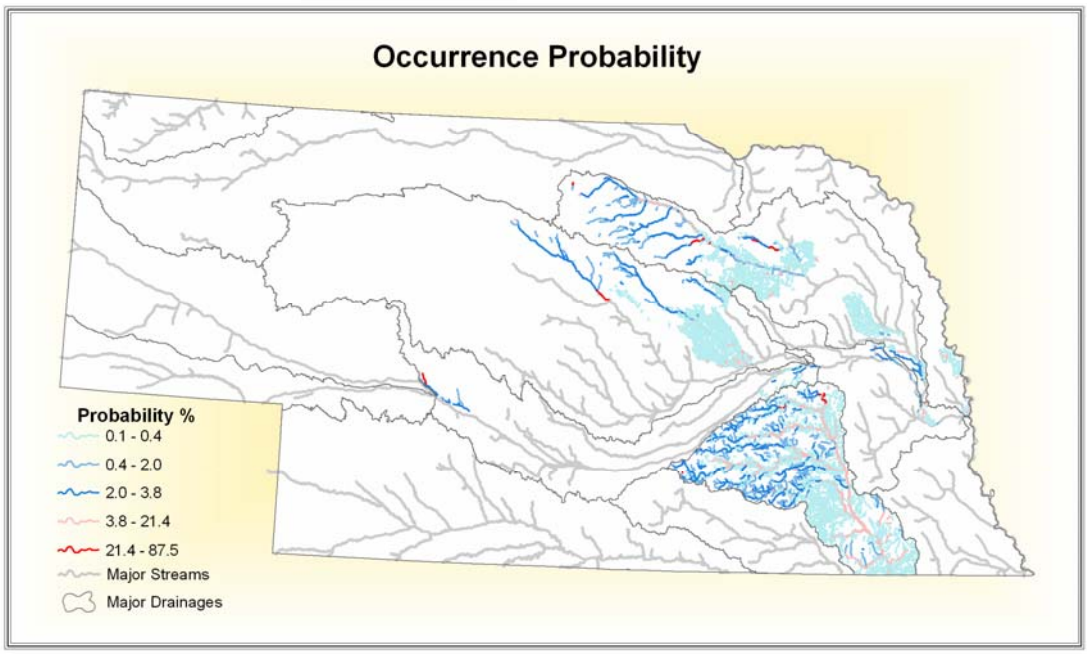
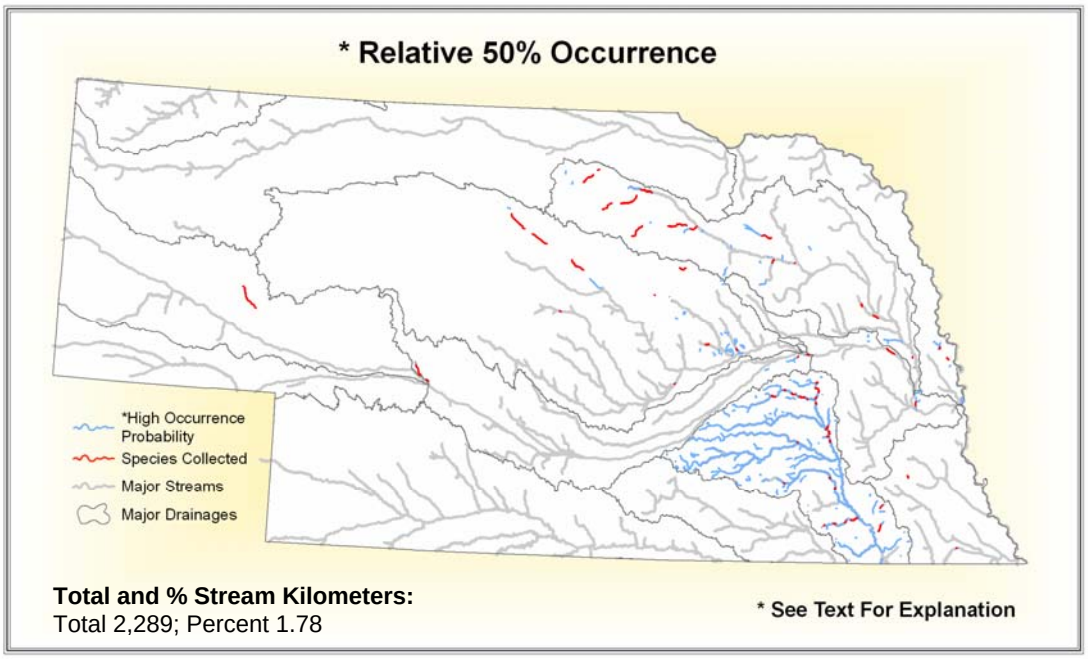
Tadpole Madtom

Noturus gyrinus

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164003
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,289; Percent 1.78

State Range:

Tadpole madtom can be found throughout the Big Blue River drainage, and in a few locales in the upper Elkhorn, Loup and Platte River drainages.

Habitat Affinities:
The tadpole madtom occurs in clear to moderately turbid water with little to no current; thick growths of submerged aquatic vegetation or accretions of organic debris are requirements. Most research indicates that the madtom prefers soft to moderately firm substrates of sand and silt (Pflieger 1997; Robinson and Buchanan 1988; Trautman 1957; Cross and Collins 1975; Phillips et. al. 1982; Eddy and Underhill 1974) but collections have been made over gravel in Kentucky (Clay 1975). The tadpole madtom is often found in the quiet waters of marshes, sloughs, and oxbows; and in impoundments and lakes in the shallow margins where cover is abundant (Cross and Collins 1975; Douglas 1974; Phillips et. al. 1982; Eddy and Underhill 1974; Trautman 1957; Robinson and Buchanan 1988; Etnier and Starnes 1993). It is the only madtom commonly found in the lakes of Minnesota (Phillips et. al. 1982; Eddy and Underhill 1974). In smaller sluggish streams, the tadpole madtom is common in quiet pools and backwaters. In swifter waters, it is found along heavily vegetated margins of drainage ditches, and in overflow areas (Etnier and Starnes 1993; Pflieger 1997). It has also been associated with streams of riffle and pool character (Clay 1975).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 1%
Commission: 4%
Overall: 95%

References:

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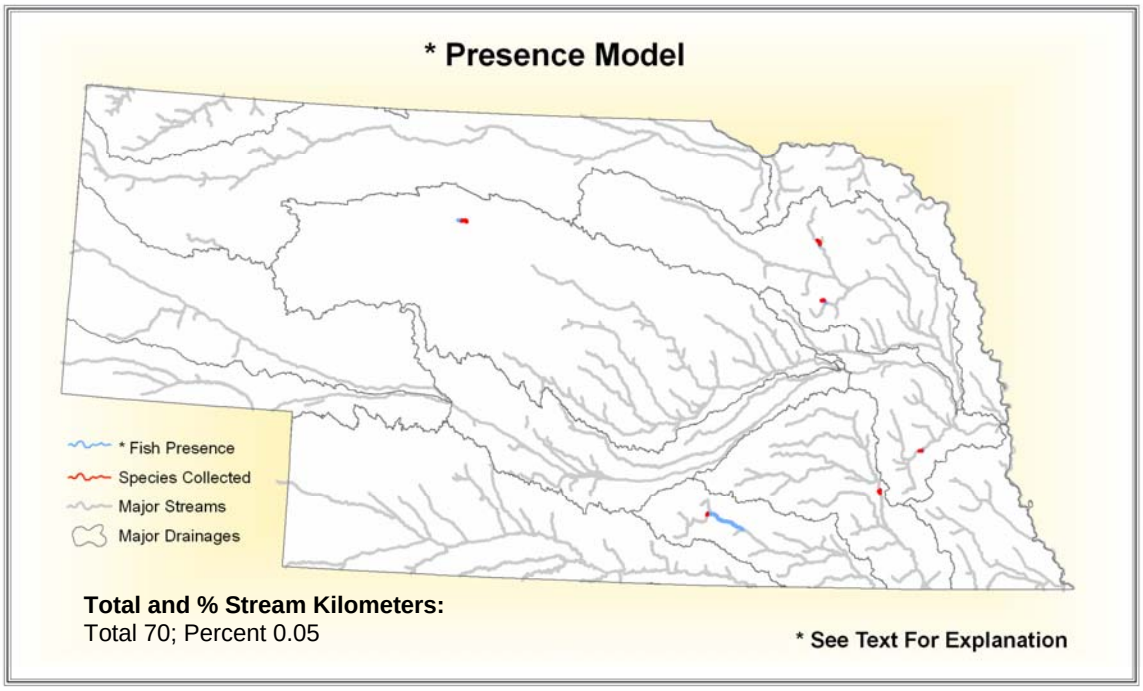
Topeka Shiner

Notropis topeka

Native: Yes
State Rank: S1
Global Rank: G2

ITIS Code: 163471
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Topeka shiner can be found in scattered locations in the Loup, Elkhorn, Platte, Little Blue and Big Blue River drainages.

Habitat Affinities:
The Topeka shiner inhabits large, open pools and runs of small, moderately clear headwater streams with silt-free sand, gravel, rubble, and bedrock substrates. Streams of this type tend to have low base flow and intermittent flow, so an important characteristic is groundwater percolation or occasionally small springs, which maintain the Topeka shiners pool habitat during dry periods (Cross and Collins 1975; Pflieger 1997). In Minnesota, populations of the Topeka shiner have probably declined from increased agricultural development and climate change (Eddy and Underhill 1974).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 0%
Overall: 100%

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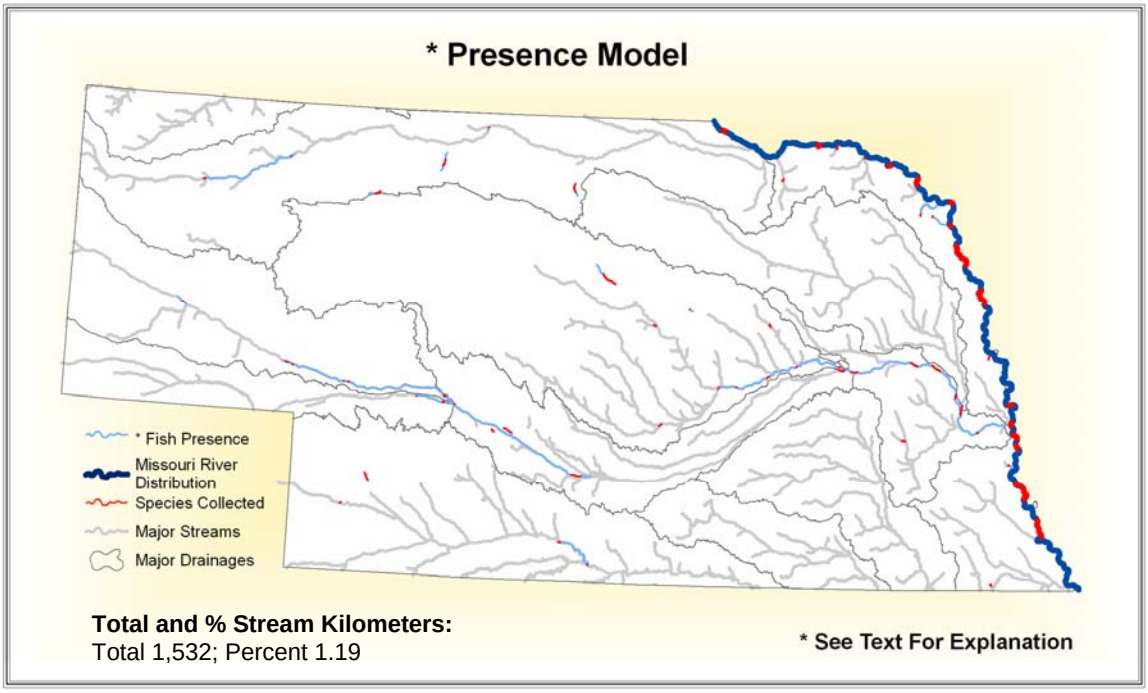
Walleye

Stizostedion vitreum

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168506
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa



State Range:

Walleye can be found scattered across the state but are largely contained in the larger lakes and reservoirs of Nebraska. Walleye can be found throughout the Missouri River and in much of the Platte and lower Loup Rivers. Its occurrence in Nebraska streams is associated with reservoirs.

Habitat Affinities:
The walleye is most abundant in large, cool, sandy-bottomed lakes, reservoirs or impoundments but also inhabits small lakes and large streams in smaller numbers (Clay 1975; Cross and Collins 1975; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). In the Missouri river, the walleye is typically found at the bottom of deep pools containing large boulders or submerged logs, but migrates to shallower waters at night (Pflieger 1997). In large northern lakes, the walleye spawns over bars or shoals (Eddy and Underhill 1974).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Presence Model:
Omission: 0%
Commission: 5%
Overall: 94%

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Western Mosquitofish

Gambusia affinis

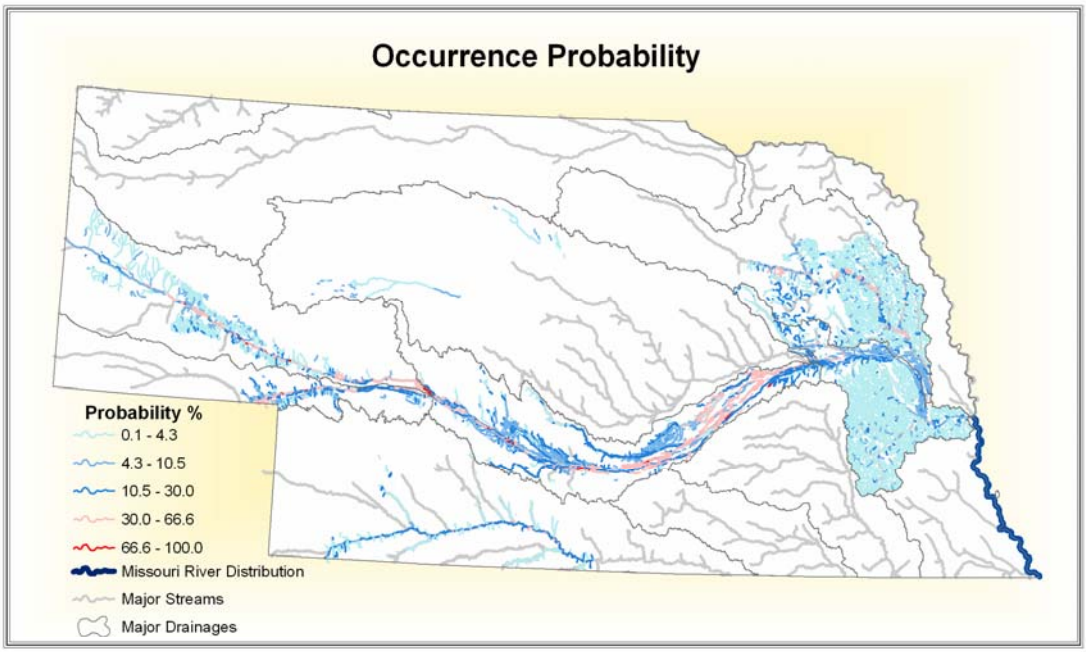
ITIS Code: 165878

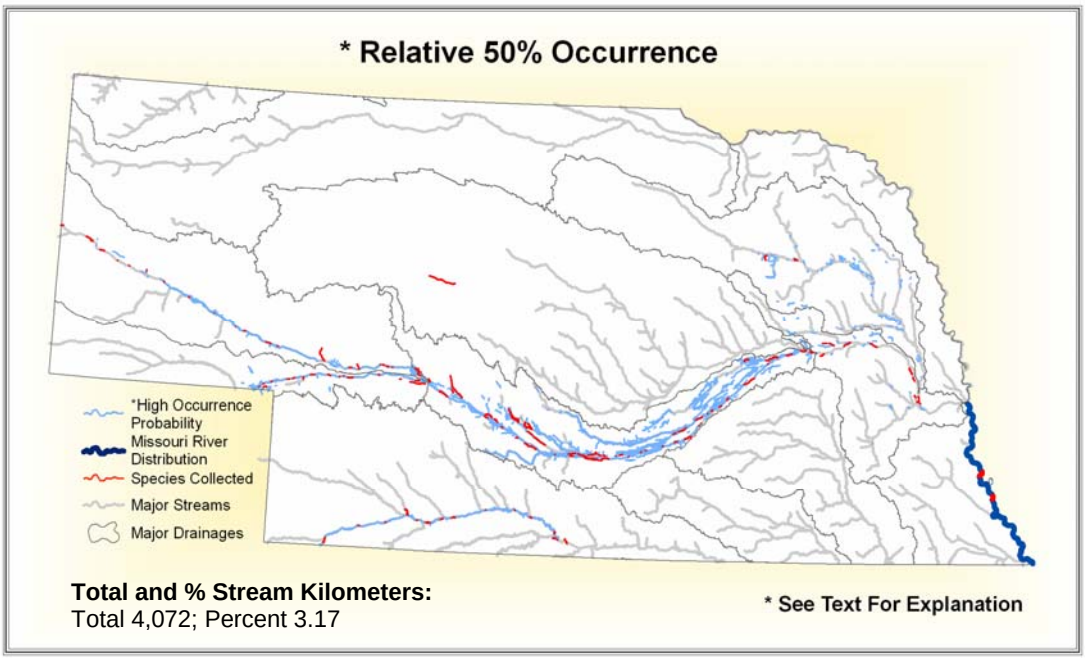
Native: No

State Rank: SNA

Global Rank: G5

Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 4,072; Percent 3.17

State Range:

Western mosquitofish can be found in the Missouri River below the mouth of Platte River. The species can be found in portions of the Republican, Loup and Elkhorn River drainages, and in much of the Platte, North Platte and South Platte River drainages.

Habitat Affinities:
The western mosquitofish can be found in a wide range of habitats, from the warm, shallow waters of swamps, ditches and impoundments to the calm backwater pools of creeks and rivers (Clay 1975; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). It moves about in groups at the surface and prefers densely vegetated shorelines with little or no current (Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Pflieger 1997; Robinson and Buchanan 1988). The western mosquitofish's aggressive nature, short life cycle and broad ecological tolerances are a serious concern in some states because it has eliminated many native small fishes through intense competition and rapid range expansion (Robinson and Buchanan 1988; Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 2%
Commission: 4%
Overall: 94%

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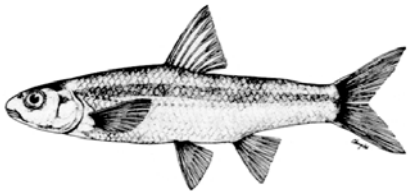
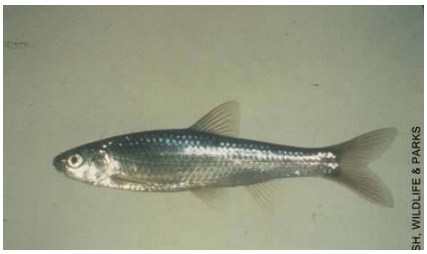
Upper Right: Photo courtesy of the Utah Division of Wildlife Resources, dwrcdc.nr.utah.gov.



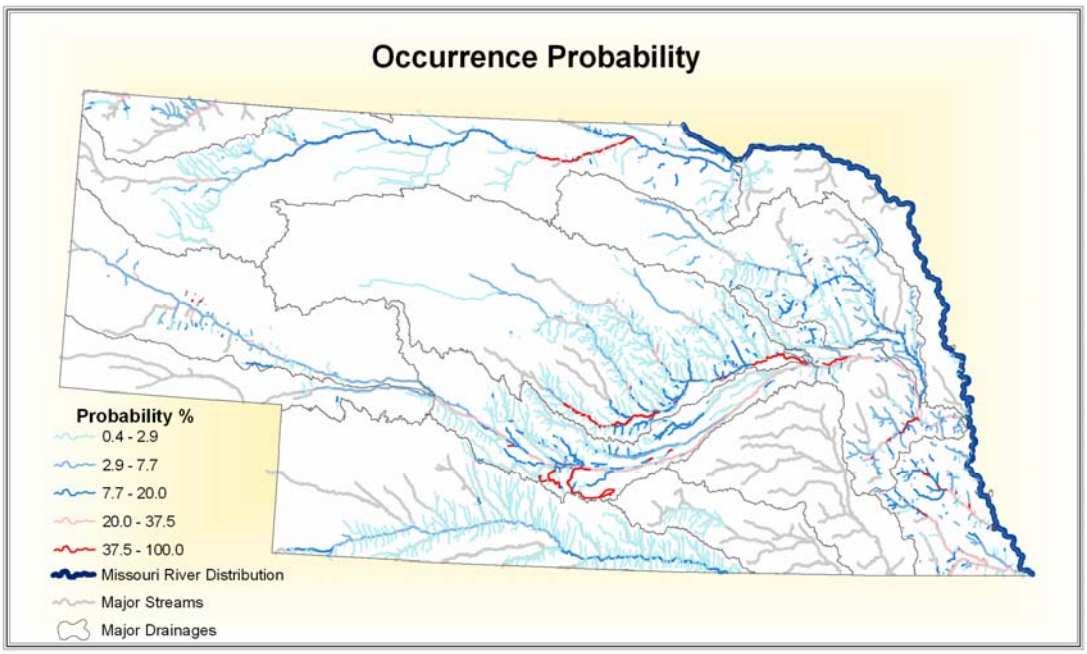
Western Silvery Minnow

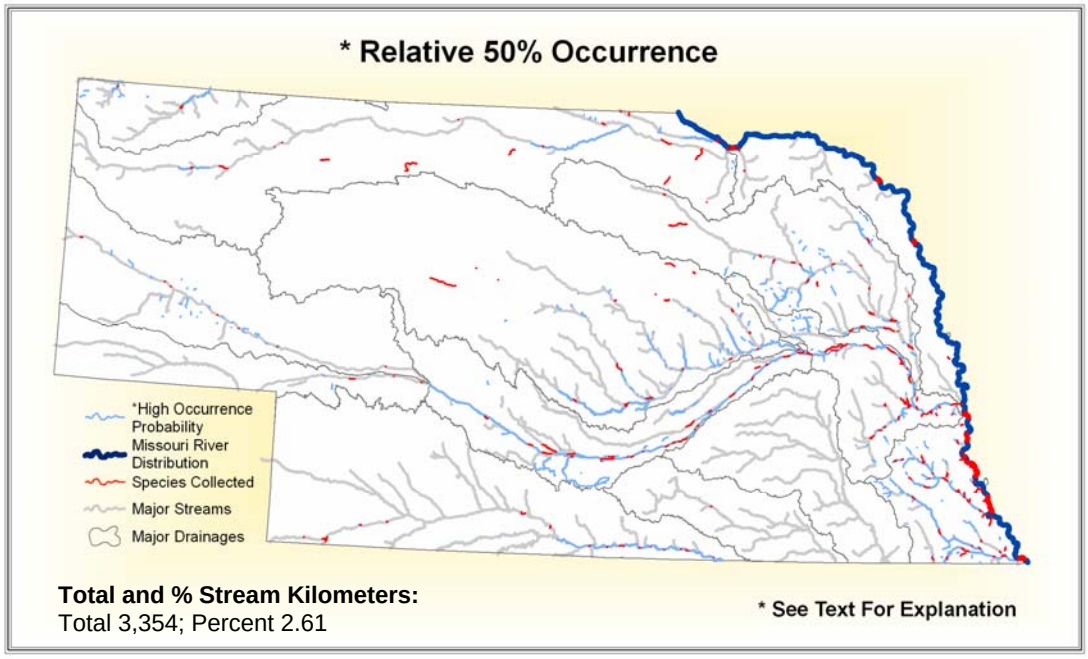
Hybognathus argyritis



Native: Yes
State Rank: S2
Global Rank: G4

ITIS Code: 163362
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 3,354; Percent 2.61

State Range:

Western silvery minnow can be found throughout the Missouri River. It is found in every major drainage in Nebraska except the Big Blue River drainage.

is found along the major rivers and their respective tributaries across the state of Nebraska. The most common areas to find them are along the Missouri, Republican, Platte, Nemaha, Loup and Niobrara Rivers. Other populations are known to be present in the lower regions of the Elkhorn River and parts of the White and Little Blue Drainages.

Habitat Affinities:

The western silvery minnow is common in the Missouri River and adjacent creeks and backwaters, where it is often found behind wing dikes, revetments, and other protected shoreline habitats. The western silvery minnow prefers relatively deep, quiet waters with sluggish flow and bottoms of silt or sand (Cross and Collins 1975; Pflieger 1997). Like the Mississippi silvery minnow, the western silvery minnow avoids strong current but it is able to tolerate higher levels of turbidity (Pflieger 1997). However, in Kansas, the western silvery minnow is sometimes taken in strong currents of the mainstream (Cross and Collins 1975).

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 4%
Commission: 8%
Overall: 88%

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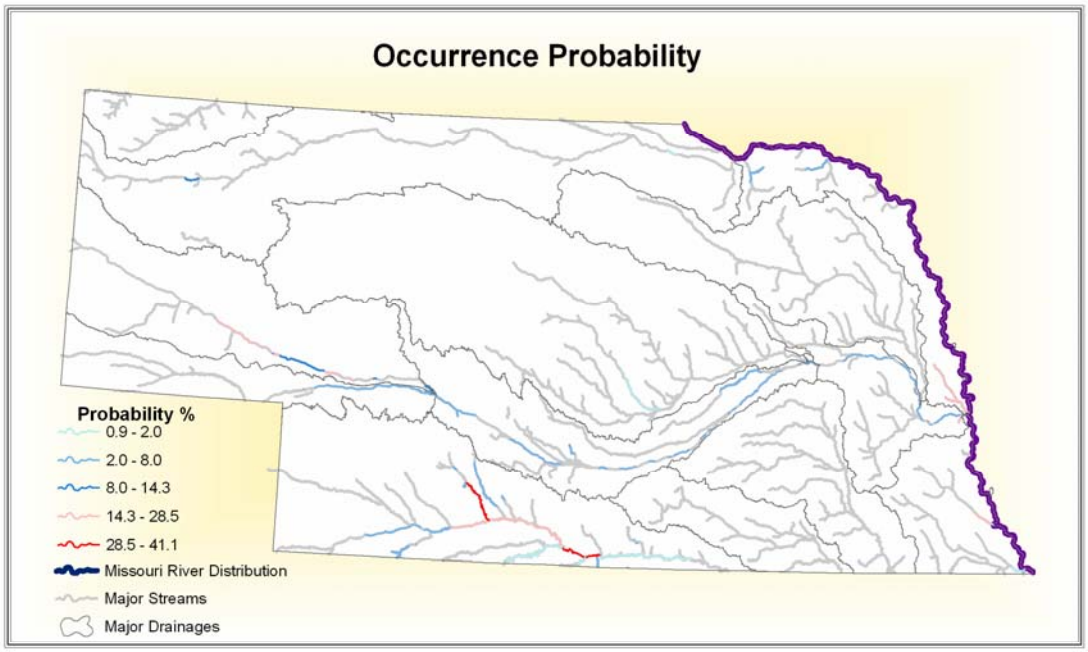
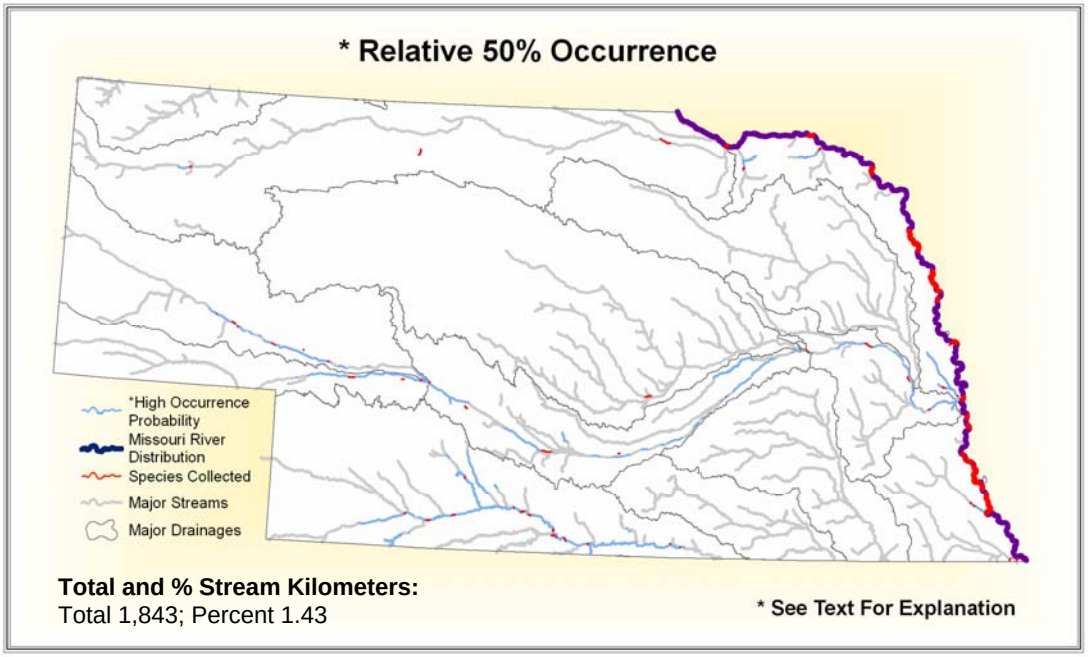
White Bass

Morone chrysops

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 167682
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

White bass can be found in scattered populations across the state. White bass can be found in the Platte, North Platte, South Platte and Republican Rivers. They can also be found in a few locales in the Niobrara River drainage and in some direct tributaries of the Missouri River.

Habitat Affinities:
The white bass inhabits the deeper pools of medium to large streams, moderate-sized rivers and reservoirs but reaches greatest abundance in large rivers, natural lakes, and impoundments (Clay 1975; Cross and Collins 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988; Trautman 1957). The range of the white bass has been expanded considerably through introduction into impoundments and reservoirs (Cross and Collins 1975; Pflieger 1997; Robinson and Buchanan 1988). The white bass is found in both quiet backwaters and current with clear water and firm substrates of sand or rock (Pflieger 1997; Phillips et. al. 1982; Robinson and Buchanan 1988). In Lake Erie, the white bass is found clear waters less than 30 ft deep with firm bottoms and an abundance of small fish on which to feed (Trautman 1957).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 6%
Overall: 93%

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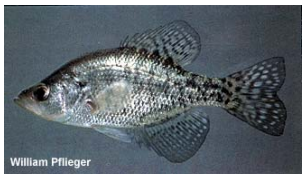
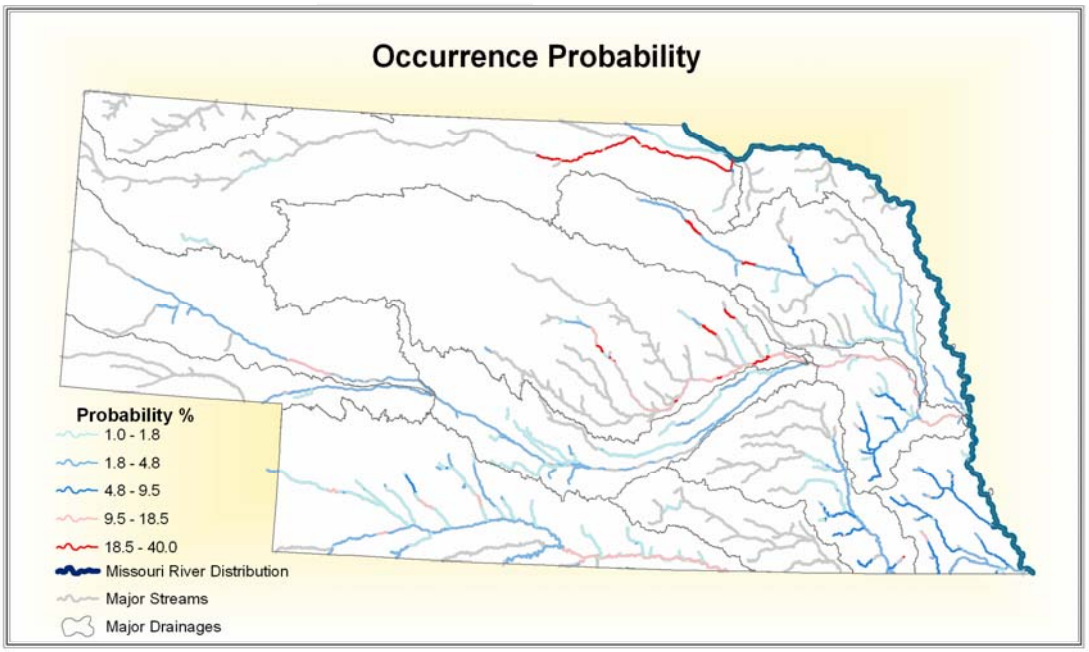


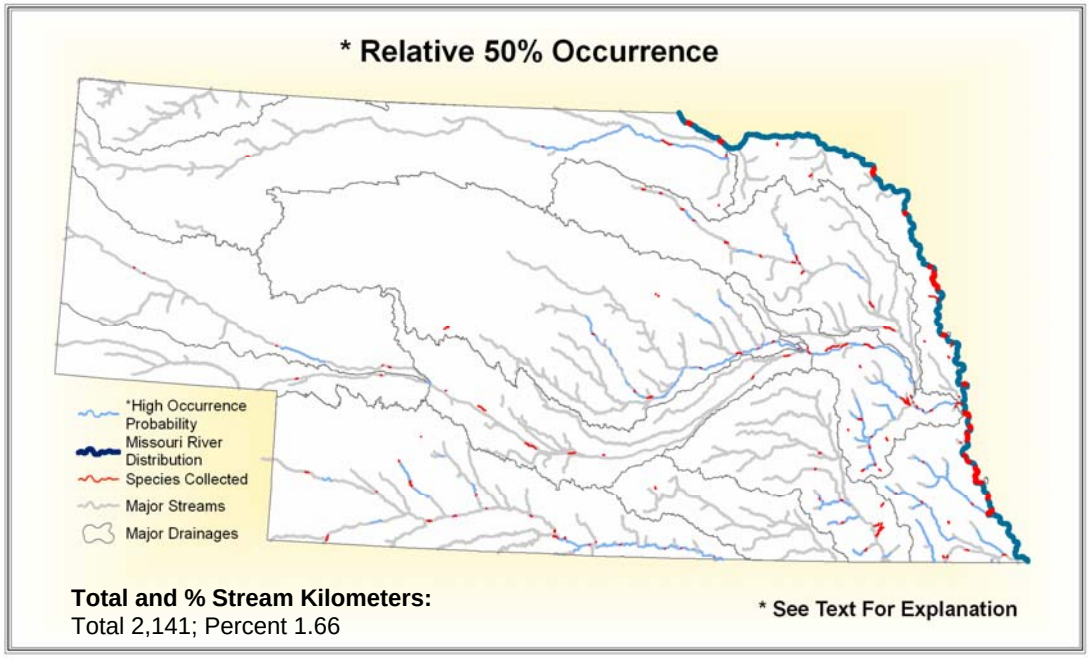
White Crappie

Pomoxis annularis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168166
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





Total and % Stream Kilometers:
Total 2,141; Percent 1.66

State Range:

The distribution of white crappie in the state of Nebraska is scattered. White crappie can be found throughout the Missouri River, and in several drainages in the state including the Republican, Platte, North Platte, South Platte, Big Blue, Little Blue, Nemaha, Elkhorn and Niobrara. White crappie can also be found in direct tributaries of the Missouri River.

Habitat Affinities:

The white crappie can be found in wide variety of lentic habitats ranging from ponds, oxbows, bays and marshes to large lakes, impoundments and reservoirs. It also inhabits the sluggish, protected areas of large rivers, moderate or large-sized streams (Cross and Collins 1975; Douglas 1974; Eddy and Underhill 1974; Etnier and Starnes 1993; Phillips et. al. 1982; Robinson and Buchanan 1988), but is intolerant of high gradients and cool waters maintained by spring flow (Pflieger 1997; Trautman 1957). The white crappie prefers quiet, turbid waters with plenty of cover, such as submerged brush, standing timber, logs, tree roots, and aquatic vegetation, and a variety of hard and soft bottoms (Douglas 1974; Etnier and Starnes 1993; Robinson and Buchanan 1988; Trautman 1957). The white crappie inhabits reservoirs containing standing timber or other cover and migrates to shallower waters to spawn (Pflieger 1997). Trautman (1957) notes that the white crappie has increased in abundance because it is able to tolerate considerable turbidity and siltation.

Predictive Model(s):

See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:

Omission: 3%
Commission: 8%
Overall: 89%

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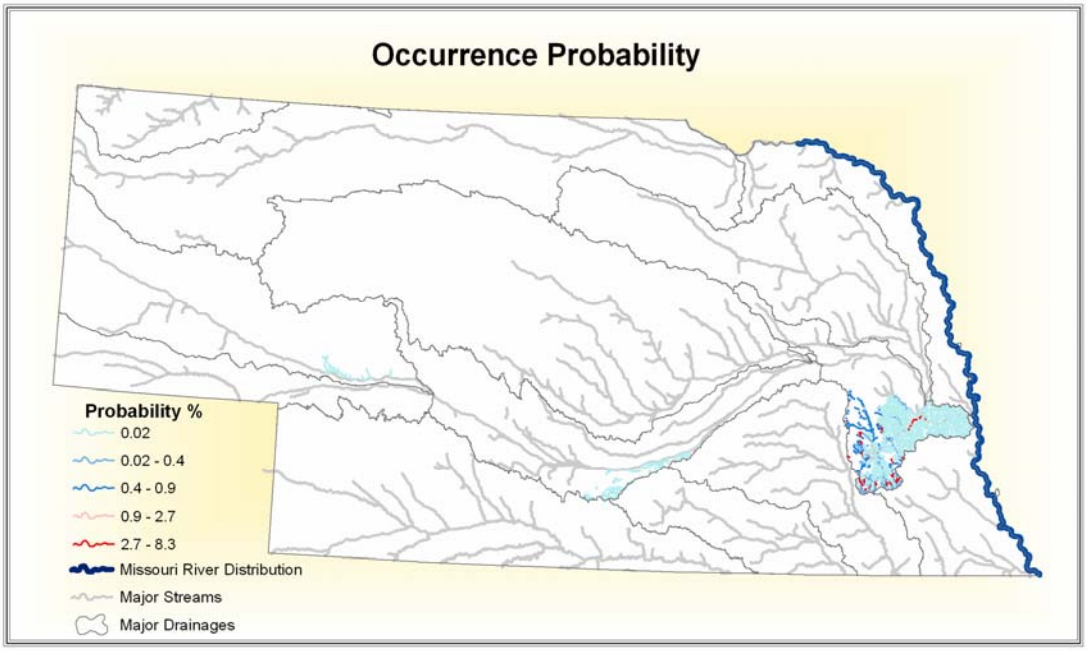
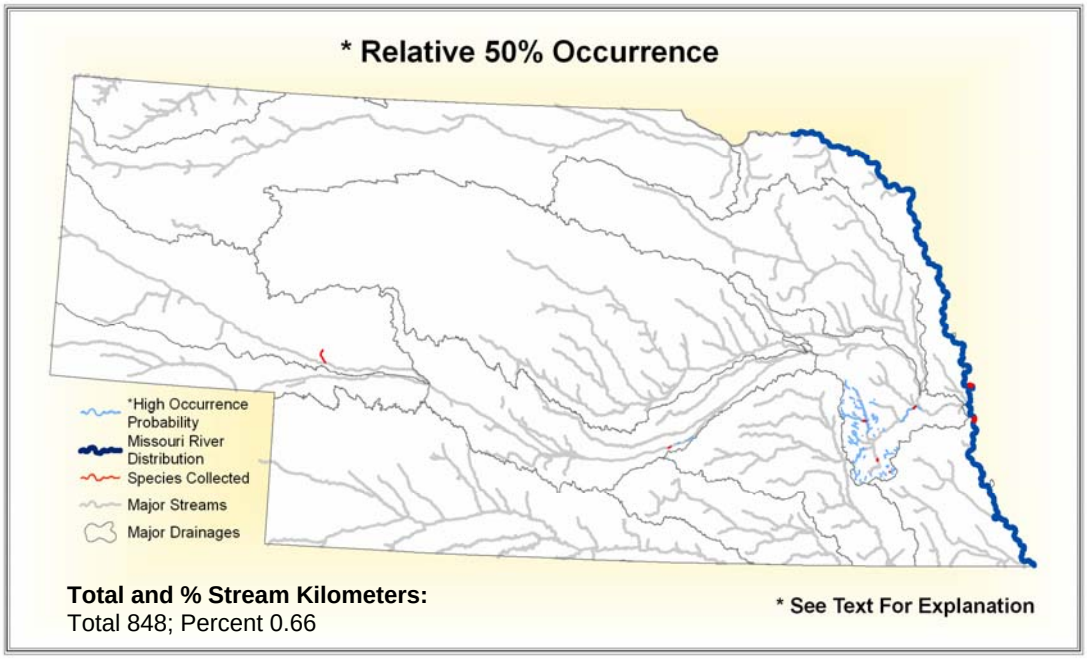
White Perch

Morone Americana

Native: No
State Rank: SNA
Global Rank: G5

ITIS Code: 167678
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:
White perch can be found in the Missouri River below Gavin's Point Dam, and in portions of the Platte and North Platte River drainages.

Habitat Affinities:
White perch are generally found along the Atlantic coast in salt water, however they migrate up small rivers and streams in the spring in order to spawn. Their habitat closely resembles that of bass and in landlocked situations, such as in Nebraska, they can reproduce at an astounding rate. If left unchecked the populations can become stunted due to overcrowding. The species generally requires deep water in order to survive but in a few cases some populations have been found in streams (Tomelleri and Eberle 1988).

Modeled Affinities:
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 4%
Overall: 96%

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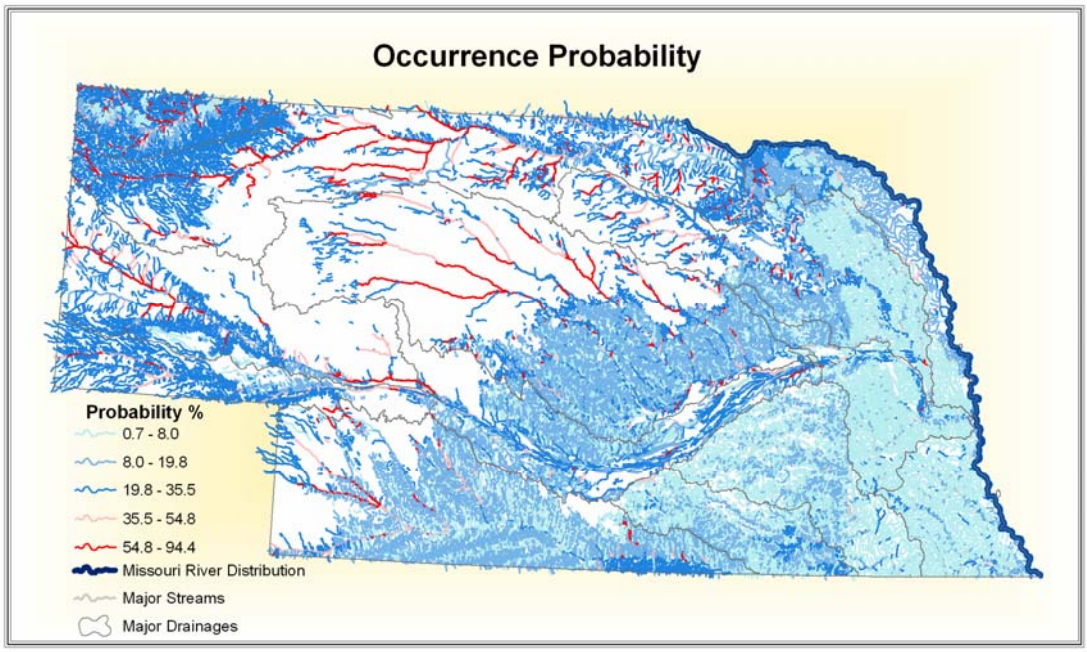
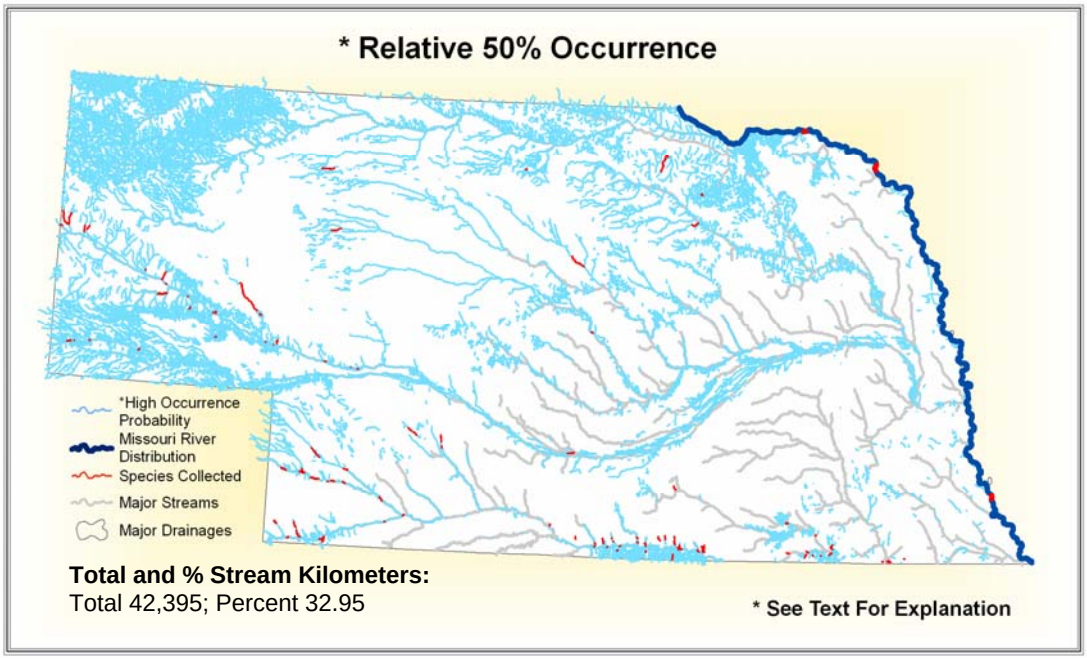
White Sucker

Catostomus commersoni

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 163895
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:

White sucker can be found throughout Nebraska in almost all waters of the state.

Habitat Affinities:
The white sucker inhabits small, high gradient creeks, especially spring pools along large streams and intermittent pools kept cool and clear by groundwater seepage (Pflieger 1997; Robinson and Buchanan 1988; Etnier and Starnes 1993; Clay 1975; Cross and Collins 1975 It prefers well-defined riffles and gravelly or rocky bottoms, and is found in greatest abundance where other suckers are absent (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975). In Ohio, the white sucker exhibits distinct habitat affinities from other areas, occurring in permanent lakes, streams, and rivers, with large populations found in nutrient-rich waters. In Ohio it tolerates all gradients, turbidity, low-oxygen water, dense vegetation, and many organic and inorganic pollutants. In Kansas, it can be found in clear lakes in the limestone uplands (Cross and Collins 1975).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 64%
Overall: 36%

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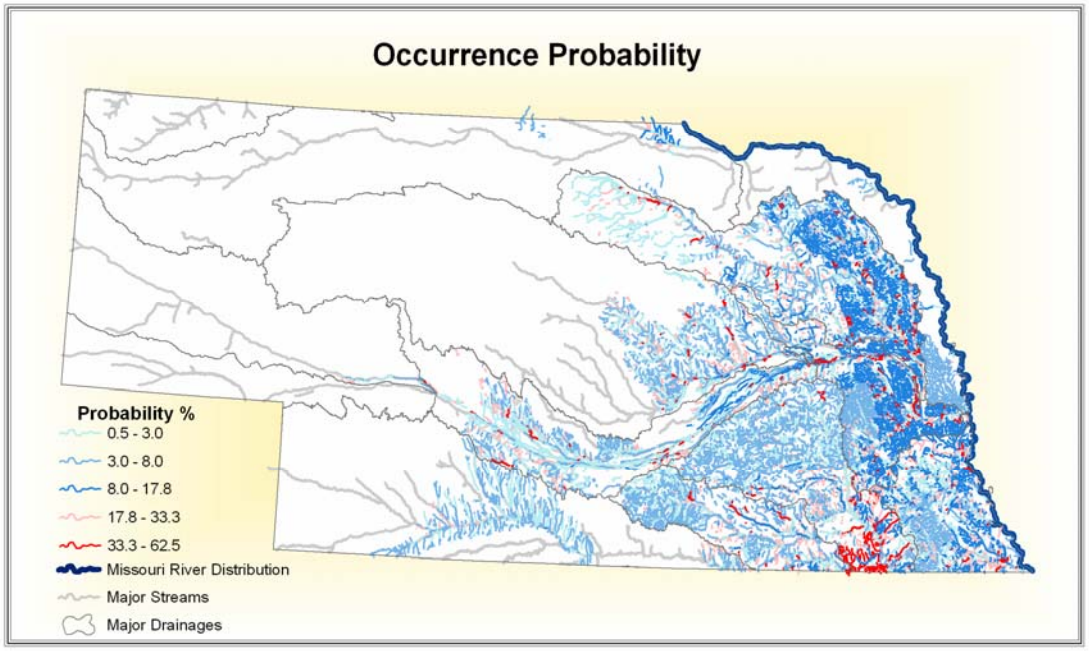
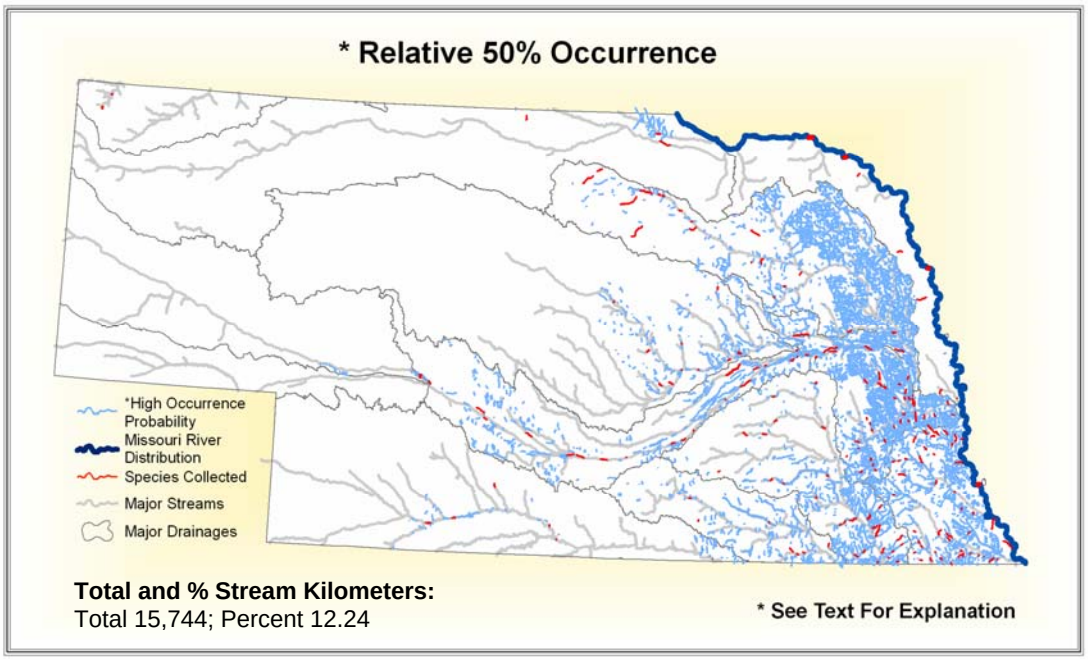
Yellow Bullhead

Ameiurus natalis

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 164041
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:
Yellow bullhead can be found throughout the Missouri River, and the middle and lower Platte, Nemaha, Big Blue, Little Blue and Elkhorn River drainages. They can be found in portions of the Republican and Niobrara River drainages and in much of the Loup River drainage. Yellow bullhead can also be found in direct tributaries of the Missouri River.

Habitat Affinities:
The yellow bullhead is found in clear streams, rivers, overflow pools, lakes and reservoirs. It prefers streams with permanent flow, but avoids strong currents (Pflieger 1997; Robinson and Buchanan 1988; Cross and Collins 1975; Douglas 1974; Etnier and Starnes 1993; Phillips et. al. 1982). In Ohio the yellow bullhead is most common in shallow portions of lakes, ponds, or streams with low gradients, over diverse bottoms from sand to peat muck (Trautman 1957). In Arkansas and Kansas, however, it is most common over gravelly or rocky bottoms (Robinson and Buchanan 1988; Cross and Collins 1975).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 3%
Commission: 17%
Overall: 81%

References:

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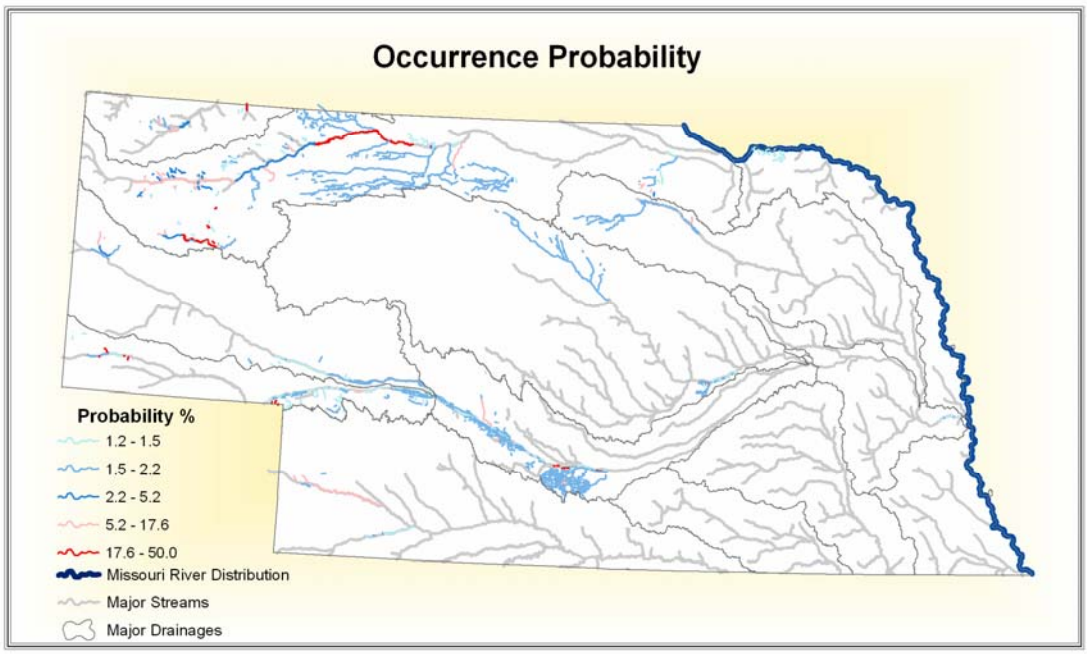
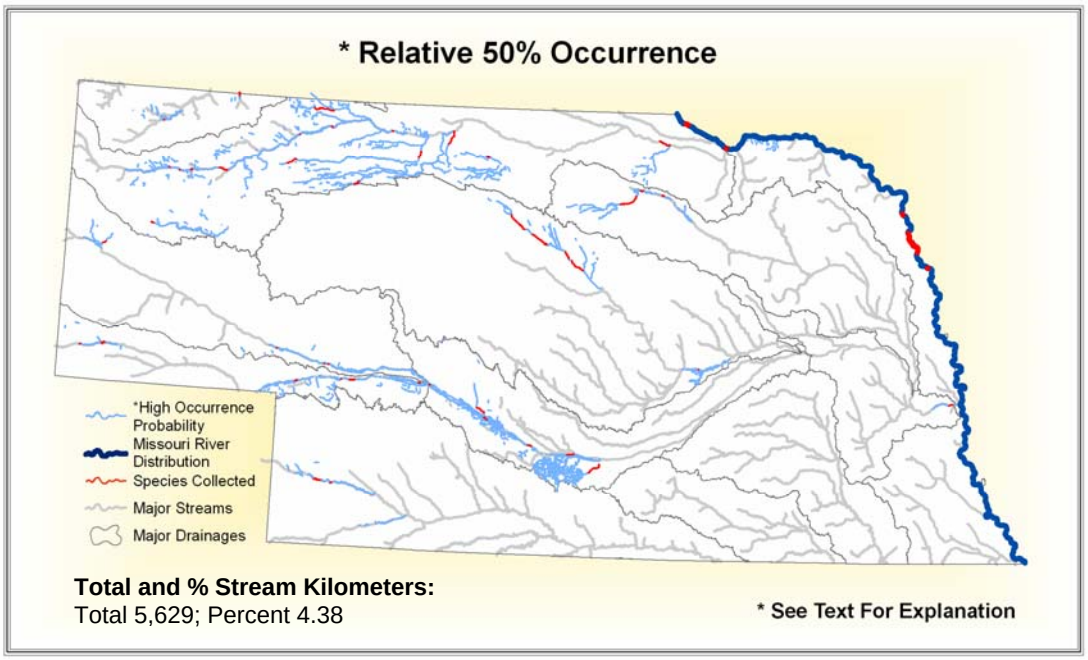
Yellow Perch

Perca flavescens

Native: Yes
State Rank: S?
Global Rank: G5

ITIS Code: 168469
Modeled By: Gust Annis, Ken Bazata, Michael Morey, Ed Peters, Steve Schainost, Scott Sowa





State Range:
Yellow perch can be found throughout the Missouri River. They can be found in the North Platte, South Platte and middle Platte River drainages; much of the Niobrara River drainage; portions of the Loup, Republican, White-Hat and lower Platte drainages, and in some direct tributaries of the Missouri River.

Habitat Affinities:
The yellow perch primarily occurs in lakes and impoundments (Pflieger 1997; Cross and Collins 1975; Phillips et. al. 1982; Etnier and Starnes 1993). It can be found in brackish water along the Atlantic seaboard (Etnier and Starnes 1993), but it generally occupies clear, quiet waters with rocky or sandy bottoms, in association with aquatic vegetation near the shore (Cross and Collins 1975; Etnier and Starnes 1993; Phillips et. al. 1982). Adults prefer deep water, and move out into open water to feed in the evening (Cross and Collins 1975; Phillips et. al. 1982).

Predictive Model(s):
See Supplement A

Accuracy Statistics For Relative 50% Occurrence Model:
Omission: 0%
Commission: 10%
Overall: 90%

References:

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