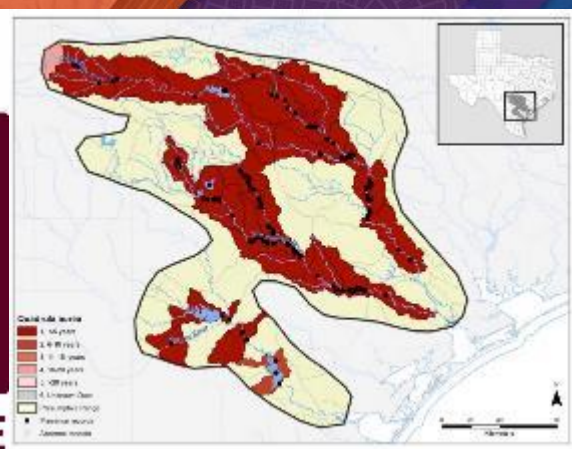




Mussels of Texas

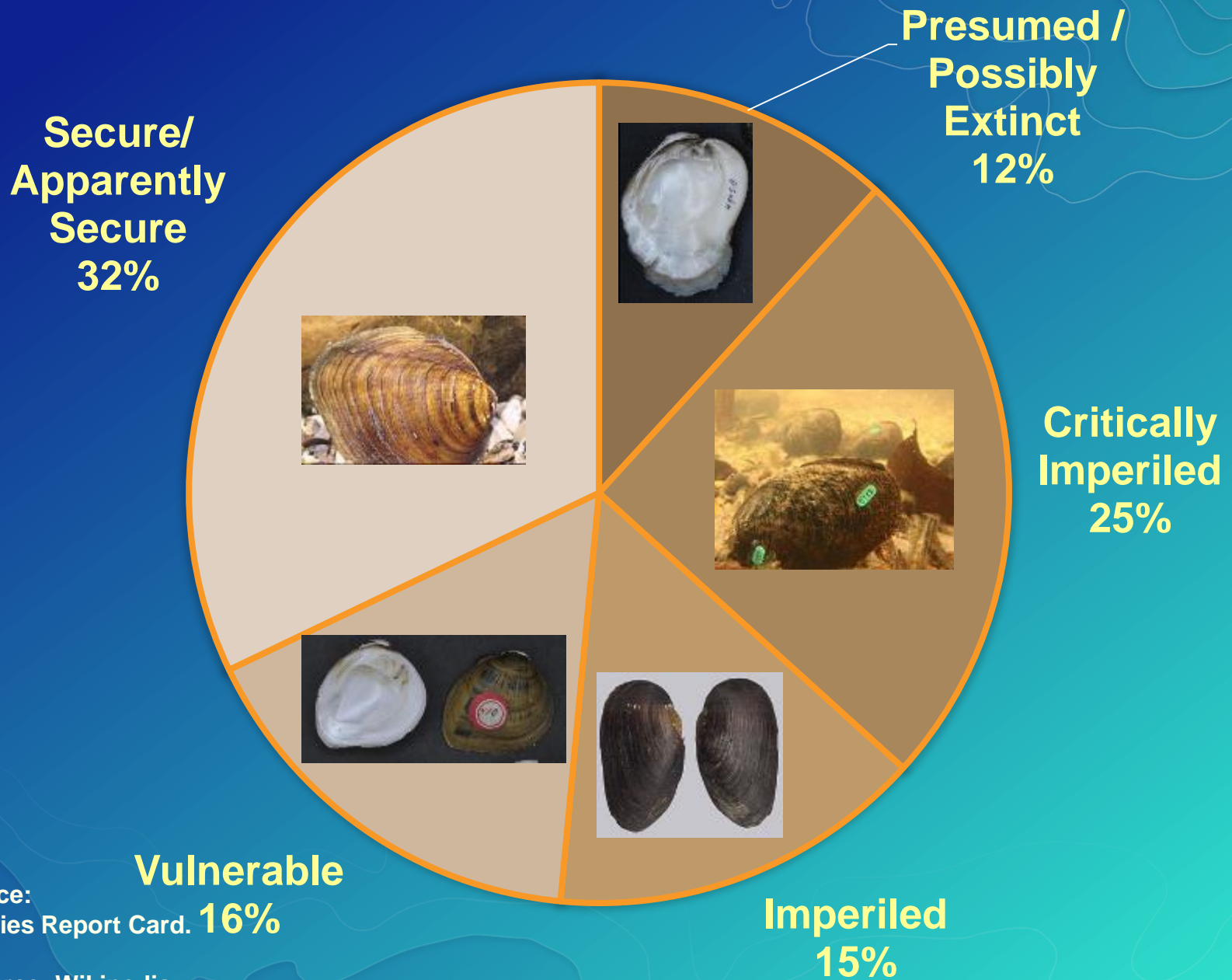
**An Online Database for Accessing
Texas Mussels Distribution Information**

**Yang Cao, Charles Randklev, Jennifer Morton,
Brian Pierce, Ross Anderson, and Roel Lopez**



Esri User Conference, 2017

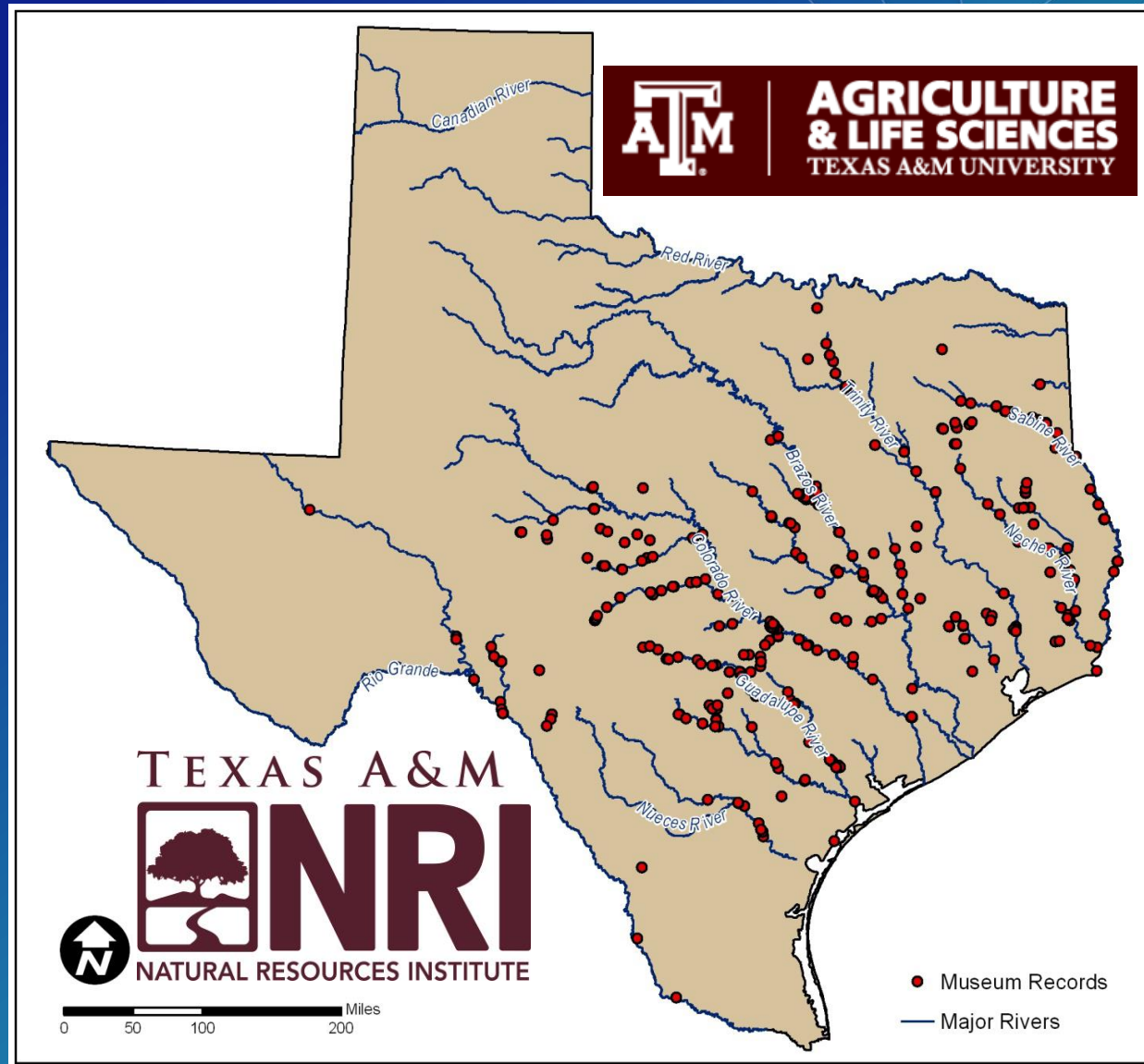
USA Mussels at risk



Data Source:
1997 Species Report Card. **16%**

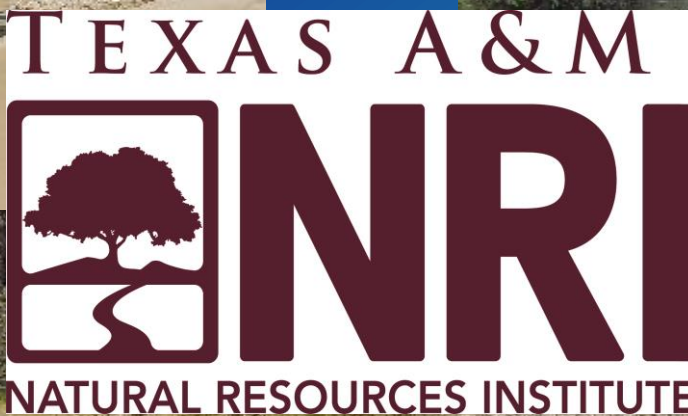
Photo Source: Wikipedia.

Our Mission



Locations of freshwater mussel species contained in the
Texas Freshwater Mussel Database

Credit: Kirk Winemiller et al., (2010) , “Status of Freshwater Mussels in Texas”



What we do

Current Texas mussel database

- Only for threatened species
- Hard to inquiry
- Lack status assessment maps

Before
2011

Contemporary sampling + historical records ($\approx 7,000$)

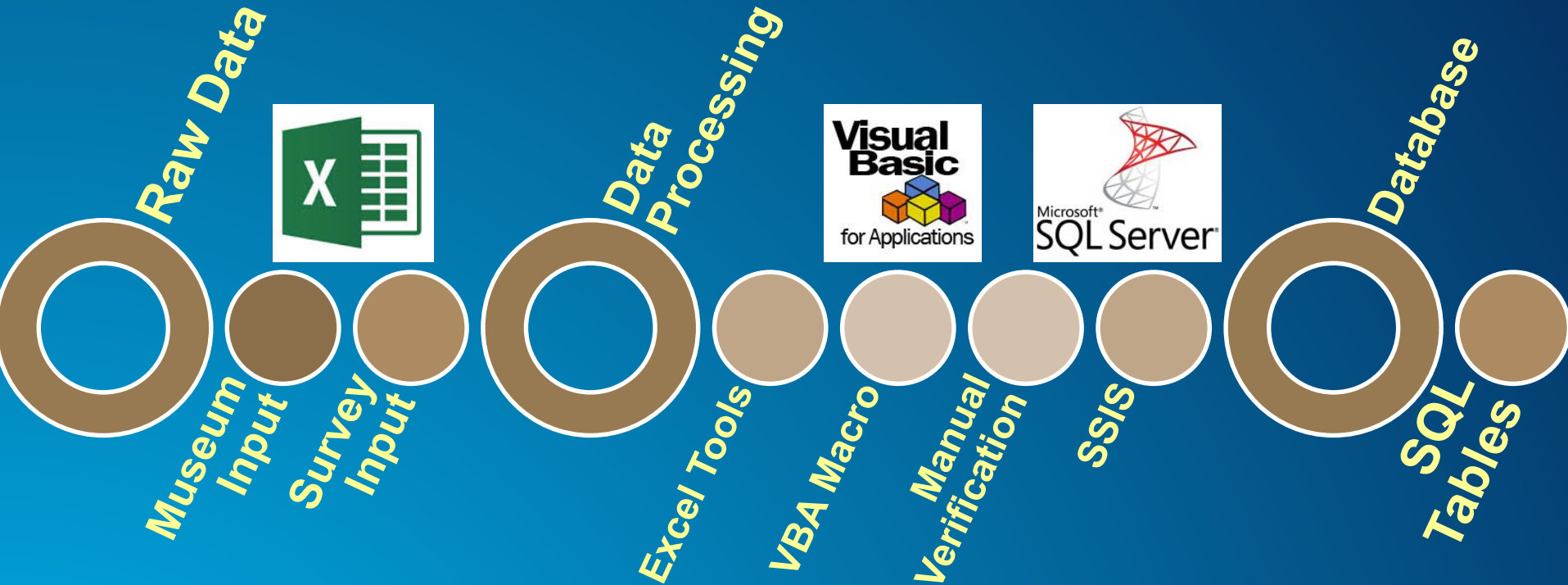
2015

Partners – CPA, TPWD, FWS, UT-Tyler, TSU, TAMU, BLOWEST, SARA, TRA, LCRA, etc. ($\approx 10,000$)

Annual Institute investment...

Ongoing

How we implemented the Database



Statewide freshwater mussel database

+	dbo.CatalogNumber
+	dbo.Collector
+	dbo.County
+	dbo.Drainage
+	dbo.HUC
+	dbo.Mussel
+	dbo.MusselCollector
+	dbo.MusselCounty
+	dbo.ShellCondition
+	dbo.Species
+	dbo.SpeciesInformation
+	dbo.Waterbody

Data Processing

	A	
1	CommonName	CorrectSpeciesName
2	threeridge	<i>Amblema plicata</i>
3	threeridge	<i>Amblema plicata</i>
4	threeridge	
5	threeridge	
6	threeridge	
7	threeridge	
8	threeridge	
9	threeridge	
10	threeridge	
11	threeridge	
12	Tampico pearlymussel	
13	Tampico pearlymussel	
14	Tampico pearlymussel	
15		
16	round pearlshell	
17	Texas fatmucket	

Remove Duplicates

To delete duplicate values, select one or more columns that contain duplicates.

Select All Unselect All My data has headers

Columns

- CommonName
- CorrectSpeciesName

OK Cancel



	B	C	D	E
Year	Date	Drainage	Waterbody	Acc
2	2002	12/21/2002	Rio Grande	Rio Grande
3	2002	12/21/2002	Rio Grande	Rio Grande
	2002	12/21/2002	Rio Grande	Rio Grande
	2002	12/21/2002	Rio Grande	Rio Grande

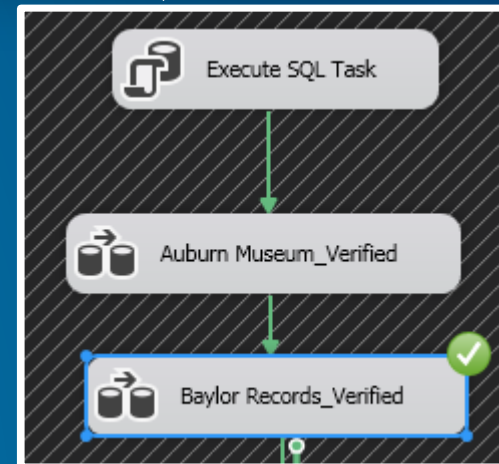
Microsoft Visual Basic for Applications - FactTableLatLongHUC.xlsm [design] - [Sheet2 (Code)]

File Edit View Insert Format Debug Run Tools Add-Ins Window Help

Project - VBAProject

HUC12ID Click

```
Private Sub CollectorID_Click()  
    Dim lastRow As Long  
    lastRow = WorksheetFunction.CountA(Range("V:V"))  
    RowCount = WorksheetFunction.CountA(Range("A:A"))  
    Dim i As Long, j As Long  
    For i = 2 To RowCount  
        If Cells(i, 20).Value <> "" Then  
            For j = 2 To lastRow  
                If LCase(Cells(i, 20).Value) = LCase(Cells(j, 23).Value) Then  
                    Cells(i, 21).Value = Cells(j, 22).Value  
                    Exit For  
                End If  
            Next j  
        End If  
    Next i  
End Sub  
  
Private Sub CountyID_Click()
```



Final Database

WFSC-BRTC-3\SQLEXPRESS.TexasMusselsV2 - dbo.HUC - Microsoft SQL Server Management Studio

File Edit View Project Debug Query Designer Tools Window Help

Object Explorer

Connect

WFSC-BRTC-3\SQLEXPRESS (SQL Server 12.0)

- Databases
 - System Databases
 - TexasMusselsV1
 - TexasMusselsV2
 - Database Diagrams
 - Tables
 - System Tables
 - FileTables
 - dbo.CatalogNumber
 - dbo.CollectDate
 - dbo.Collector
 - dbo.County
 - dbo.Drainage
 - dbo.HUC
 - dbo.Mussel
 - dbo.ShellCondition
 - dbo.Source
 - dbo.Species
 - dbo.Waterbody
 - Views
 - Synonyms
 - Programmability
 - Service Broker
 - Storage

WFSC-BRTC-3\SQL...sselsV2 - dbo.HUC

	HUC12ID	HUC12Name	HUC12Code	HUC10Name	HUC10Code
1	1	City of Mayer	111203010101	Upper McClella...	111203010101
2	2	Joe Lake Creek-...	111301030408	Wind River-Nor...	111301030408
3	3	111302050207	111302050207	Lower South Wi...	111302050207
4	4	Mustang Creek...	111302050208	Lower South Wi...	111302050208
5	5	Gray Creek-Wic...	111302060106	Lake Kemp-Wic...	111302060106
6	6	Pond Creek-Wi...	111302060407	Buffalo Creek-...	111302060407
7	7	Lake Kickapoo	111302090107	North Fork Littl...	111302090107
8	8	Lower Onion Cr...	111302090207	South Fork Littl...	111302090207
9	9	Mud Creek	111401060503	Walnut Bayou-...	111401060503
10	10	Upper Days Cre...	111403020704	Sulphur River O...	111403020704
11	11	Upper Paw Paw...	111403040402	Paw Paw Bayou	111403040402
12	12	Blundell Creek-...	111403050204	Brushy Creek-B...	111403050204
13	13	Tankersley Creek	111403050301	Boggy Creek	111403050301
14	14	Maddox Branch...	111403060102	French Creek-B...	111403060102
15	15	Beckum Creek-...	111403060403	Big Cypress Bay...	111403060403
16	16	Carter Lake-Big...	111403060404	Big Cypress Bay...	111403060404
17	17	Kitchen Creek-...	111403060407	Big Cypress Bay...	111403060407
18	18	Watson Bayou-...	111403060408	Big Cypress Bay...	111403060408
19	19	Tete Bayou-Fro...	111403060411	Big Cypress Bay...	111403060411

Properties

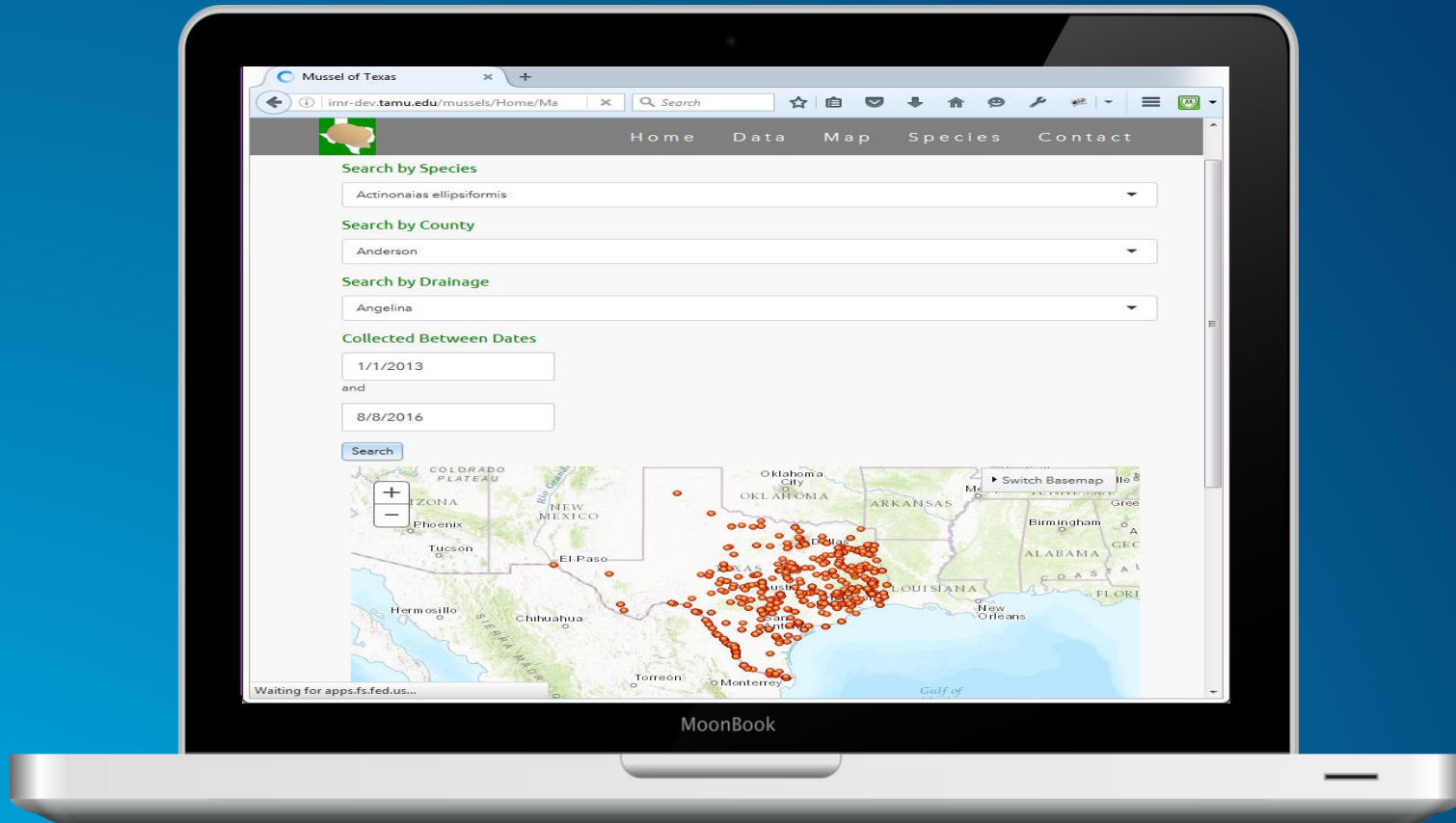
[Qry] Query1.dtg

(Identity)

(Name)	Query1.dtg
Database Name	TexasMusselsV2
Server Name	wfsc-brtc-3\sqlexpress
Destination Table	
Distinct Values	No
GROUP BY Extensi	<None>
Output All Colum	No
Query Parameter	No parameters have been defined
SQL Comment	***** Script for Select To
Top Specification	No

Ready

Website Development Tools



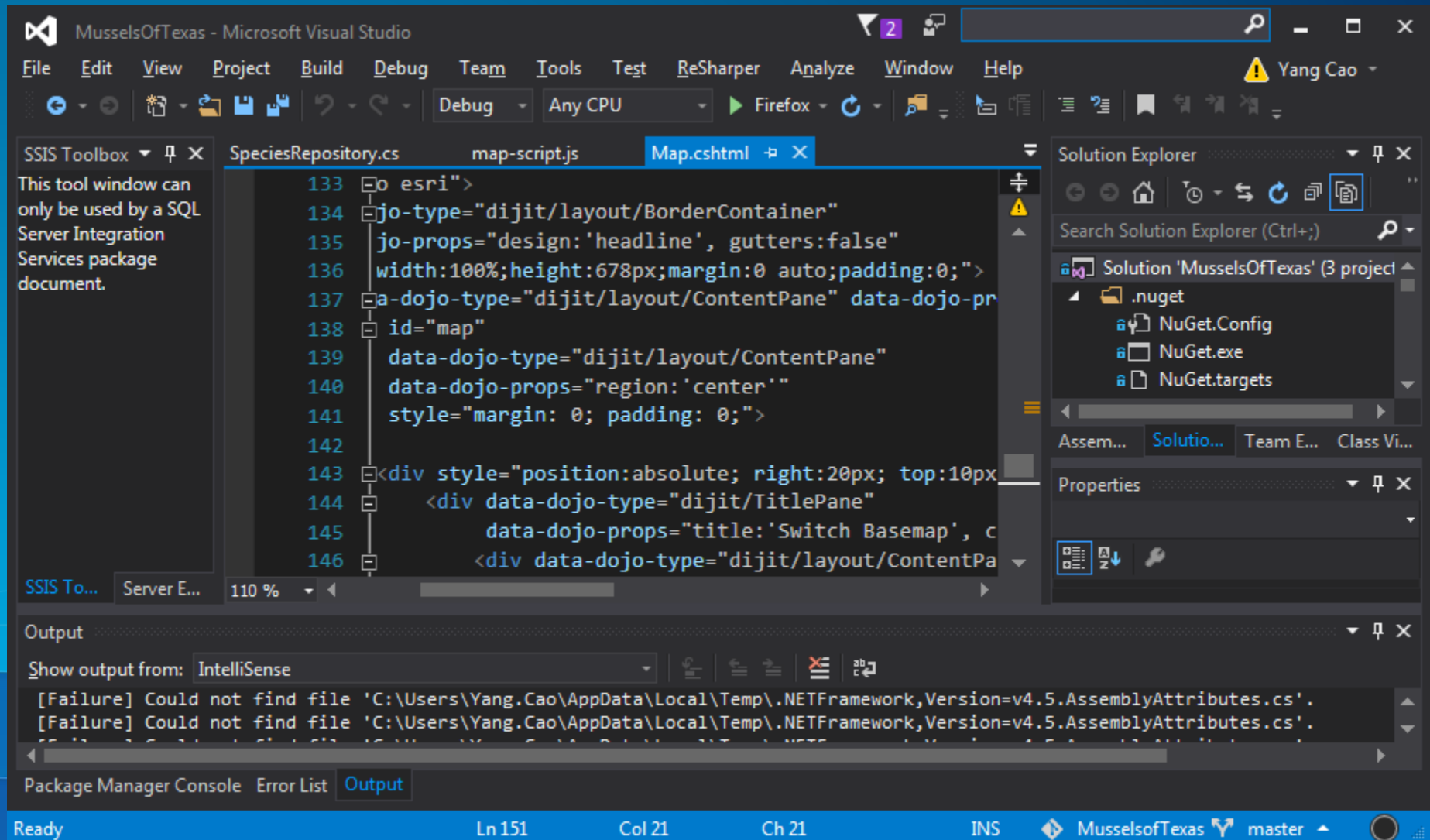
❑ Microsoft ASP.NET MVC



❑ ArcGIS API for JavaScript



C# & ASP.NET Development Environment



MVC Makes Mobile Friendly

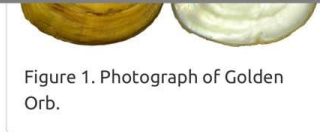
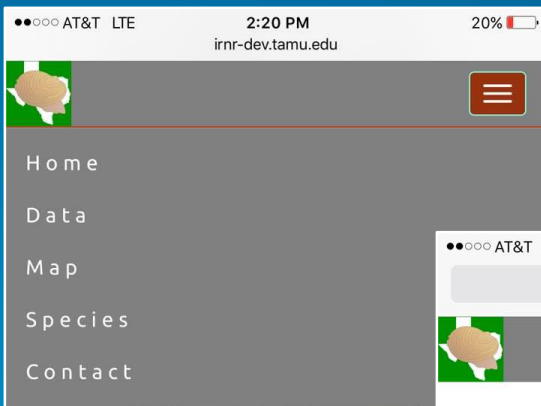


Figure 1. Photograph of Golden Orb.

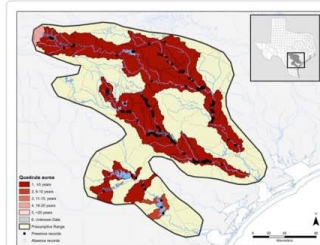


Figure 2. Range map of Golden Orb.



Data Query

Taxonomy:

Collected By:

County:

Waterbody:

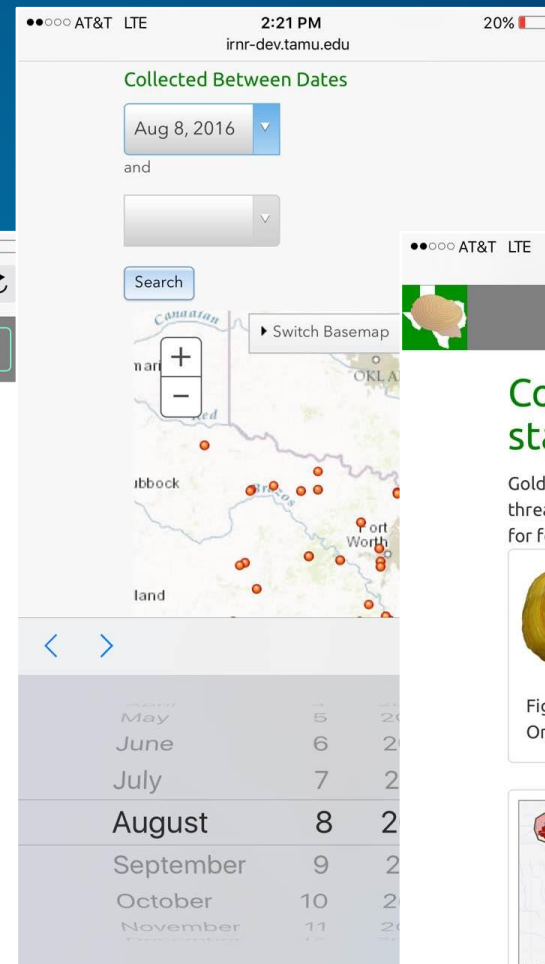
Drainage:

Filter

0 Record(s) found:

Scientific Name	Common Name	Location	Catalog Number
-----------------	-------------	----------	----------------

© 2016 - Texas A&M Institute of Renewable Natural Resources



Collected Between Dates

Aug 8, 2016

and

Search



< >

May	5	24
June	6	2
July	7	2
August	8	2
September	9	2
October	10	2
November	11	2



Conservation status

Golden orb is listed by TPWD as legally threatened and it is being considered for federal listing.



Figure 1. Photograph of Golden Orb.

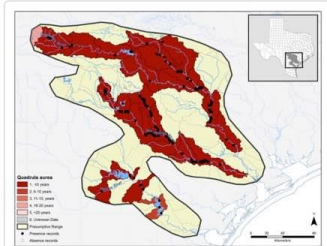


Figure 2. Range map of Golden Orb.

Data Page

Data Query

Taxonomy:

Amblema plicata threeridge

Collected By:

Dobie, J.L.

County:

Llano

Waterbody:

Llano River

Drainage:

Colorado

Filter

6 Record(s) found:

Scientific Name	Common Name	Waterbody	Catalog Number
Amblema plicata	threeridge	Llano River	4048
Amblema plicata	threeridge	Llano River	4027
Amblema plicata	threeridge	Llano River	4066
Amblema plicata	threeridge	Llano River	2977
Amblema plicata	threeridge	Llano River	2945
Amblema plicata	threeridge	Llano River	2949

Search
Keywords

Search
Results

Layer List

Select the various levels of HUC you would like on the map. Zoom in and out to see them.

☐ HUC2☐ HUC4☐ HUC6☒ HUC8☐ HUC10☐ HUC12

Search by Species

Fusconaia mitchelli false spike

Search by County

Webb

Search by Waterbody

Rio Grande

Search by Drainage

Rio Grande

Collected Between Dates

01/01/2007

and

02/12/2017

Search

HUC
Layers

Search
Keywords

Map
Page

Map Page

Map Display

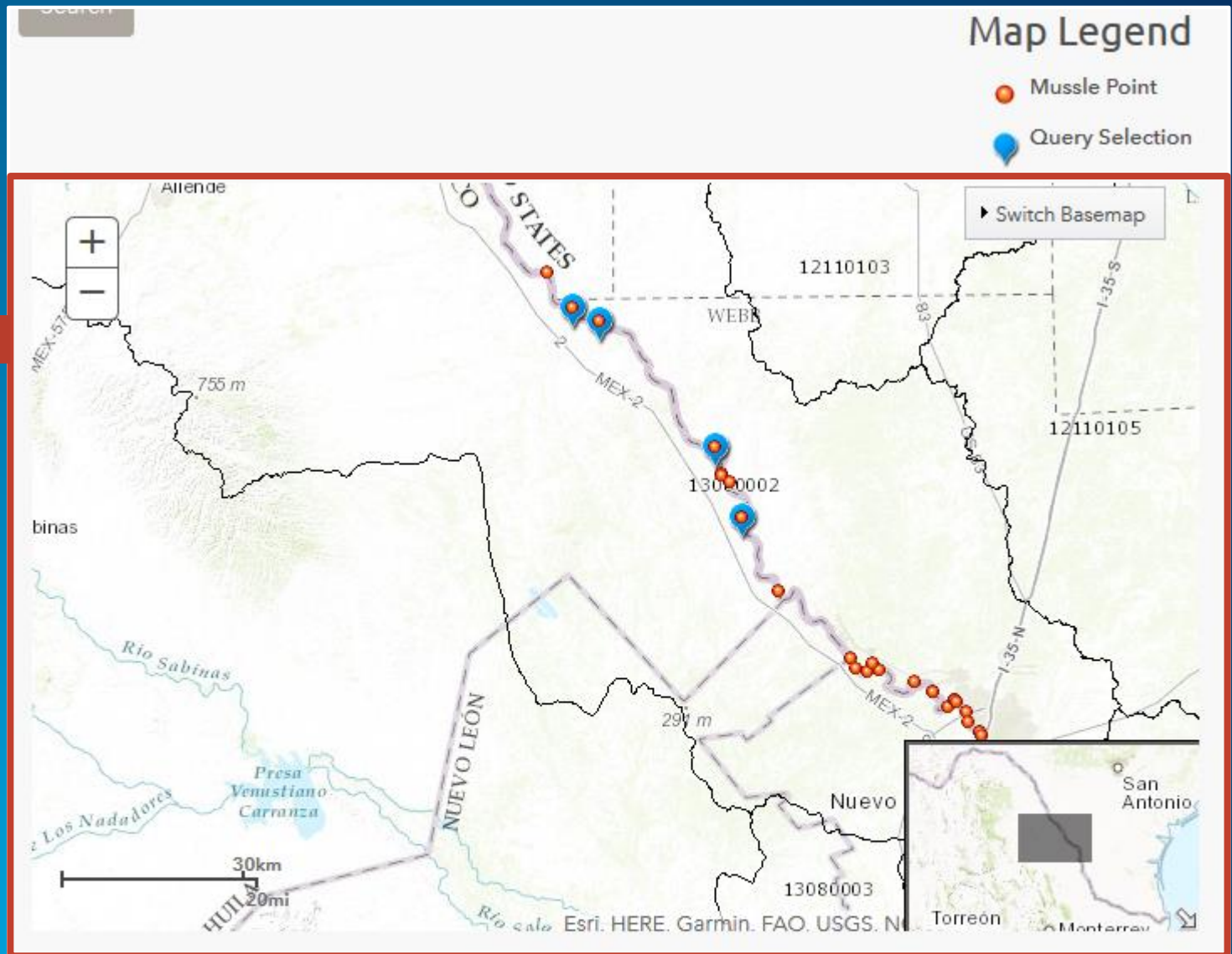




Table Display

Total 8 Record(s) selected

Species	County	Waterbody	Drainage	Date Collected
Fusconaia mitchelli	Webb	Rio Grande	Rio Grande	4/8/2009
Fusconaia mitchelli	Webb	Rio Grande	Rio Grande	4/8/2009

Search

Map Legend

-  Mussle Point
-  Query Selection

Switch Basemap



National
Geographic



Oceans



Terrain with

Attributes (1 of 4)

Species: *Potamilus metnecktayi*

County: Webb

Waterbody: Rio Grande


Drainage: Rio Grande

Date Collected: April 8, 2009.

[Zoom to](#)

Map
Page

Other GIS
functions



[Home](#)
[Data](#)
[Map](#)
[Species](#)
[Contact](#)

Species


Detailed info about species

SpeciesId

Golden Orb *Quadrula aurea*

Submit

Species Page



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[Data](#)
[Map](#)
[Species](#)
[Contact](#)

Golden Orb

Description

Shell shape: ranges from oval to nearly round, subquadrate and somewhat subrectangular.

Shell: moderately compressed, solid and moderately thick; posterior ridge is broad and rounded and is sometime double; anterior end rounded; dorsal margin slightly curved; ventral margin straight to slightly curved; posterior end almost truncated.

Umbo: elevated above the hinge line, but not high or extremely full; beak cavity is moderately deep.

Pseudocardinal teeth: two left and one right, are large, but not massive; left pseudocardinal teeth are triangular or square, slightly compressed, posterior-most tooth somewhat less elevated than anterior tooth.

Lateral teeth: are relatively short, only slightly thickened and straight to very slightly curved.

Periostracum: yellowish-orange, orangish-tan, brown, dark brown or black, sometimes with green vague rays; typically no external sculpturing, but some specimens may have faint pustules on the central disk.

Nacre: white or bluish-white, iridescent posteriorly

Habitat

Often abundant in riffles but can occur in other habitat types in mud, sand and gravel.

Range

Endemic to the Nueces-Frio and San Antonio-Guadalupe drainages. Extant populations remain throughout most of its presumptive range, though its taxonomy is in question.

Conservation status

Golden orb is listed by TPWD as legally threatened and it is being considered for federal listing.




Figure 1. Photograph of Golden Orb.

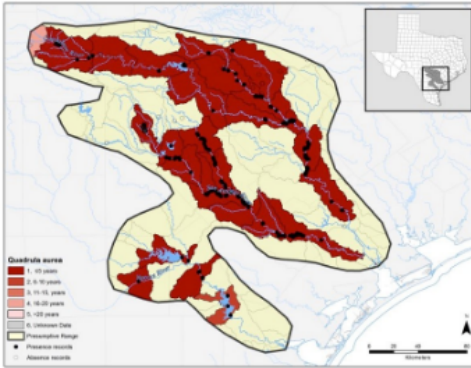
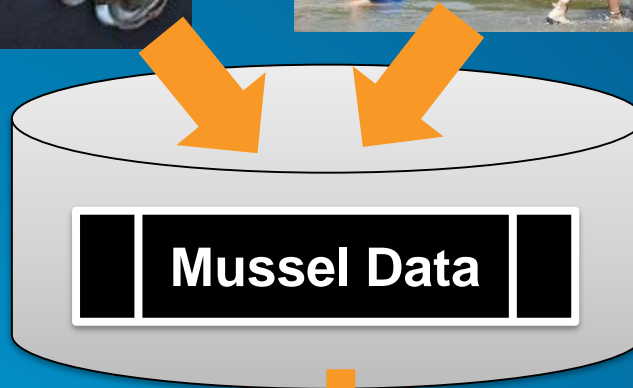


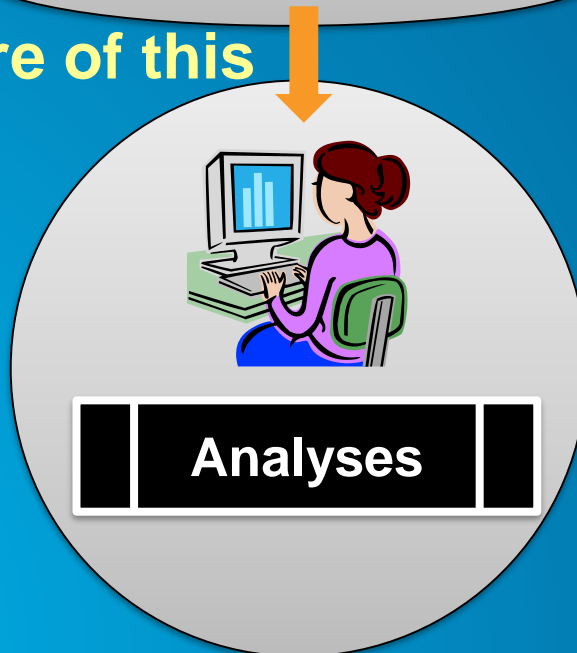
Figure 2. Range map of Golden Orb.

Benefits

Photo
Source:
Wikipedia.



Need more of this



- ✓ **Mussels of Texas Project can help**
- ✓ **For all the mussel species**
- ✓ **Conservation status assessment maps**

Future Possibilities



□ More Data



□ More Search Keywords



□ User Account Management

Thank You



yang.cao@ag.tamu.edu