Homework #4
Pennsylvania Deer Problem

Background Information

The Pennsylvania Game Commission is a state agency charged with managing wildlife resources throughout Pennsylvania. An integral part of this job is managing the population of deer to provide fair hunting opportunities for outdoorsmen.

To help with management, the Game Commission has divided Pennsylvania into a series of Wildlife Management Units (WMUs), which are areas that share a similar locale and geographic characteristics. The WMUs serve as the basis for the Game Commission's efforts to provide a sustainable deer population.

Hunters are permitted to harvest (kill) an unlimited number of male deer. Hunters who wish to harvest a female deer must buy a special license that entitles them to kill one deer. A fixed number of licenses are issued for each Wildlife Management Unit.

Problem Statement

In this assignment, students will explore data released by the Pennsylvania Game Commission from 2008 to 2012 concerning the deer harvest for each Wildlife Management Unit. By analyzing this data, trends within the various Units can be investigated.

Instructions

IMPORTANT: This assignment requires the Windows version of Microsoft 365. macOS users can access a ready-to-use version through Windows Virtual Desktop by following the instructions at https://cs101.wvu.edu/wvd.

IMPORTANT: Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.

1. Download and extract the provided Data Files ZIP file. It contains the following files for use in this assignment:

    a. **counties.xml** – List of counties in each WMU [1].

Table: *Counties*		
Field Name	**Type**	**Description**
WMU	Short Text	Part of composite key. Wildlife Management Unit, a region of Pennsylvania for game management purposes.
County	Short Text	Part of composite key. Name of a county within the listed WMU.

b. **annualdata.xml** – Data on annual deer harvests and license sales for each Wildlife Management Unit [2]–[4].

Table: *AnnualData*		
Field Name	**Type**	**Description**
DataYear	Number	Part of composite key. Year the hunting season began.
WMU	Short Text	Part of composite key. Wildlife Management Unit.
FirearmHarvest	Number	Total number of female deer harvested with a firearm for this WMU and year.
ArcheryHarvest	Number	Total number of female deer harvested with a bow for this WMU and year.
Licenses	Number	Number of licenses issued for hunting female deer.

2. Create a new Microsoft Access database named **hw4_*lastname_firstname*_pdp.accdb**.

3. Import the following items into the database:

   a. **annualdata.xml** file – Import structure and data into a new table.

   b. **counties.xml** file – Import structure and data into a new table.

4. We need to create a new table to store information about the Wildlife Management Units for which we have data.

   a. Create a table named *WMU* with the fields below. Use appropriate field types and designate a good primary key.

Table: *WMU*	
Field Name	**Description**
WMU	Wildlife Management Unit.
Region	Name of region in which WMU is located.
SampleSize	The number of samples used to create the Regeneration Rate statistic.
RegenerationRate	A statistic which defines how well the forests in the WMU re-grows. Format as a percentage-type number with no decimal places.
Health	Health rating for this WMU (Good, Fair, Poor, or N/A).

b. Enter records for all Wildlife Management Units below [5].

HINT: The *WMU* table will contain 22 records.

WMU	Region	SampleSize	RegenerationRate	Health
1A	Northwest	16	48%	Fair
1B	Northwest	20	44%	Fair
2A	Southwest	21	41%	Fair
2B	Pittsburgh Metro	12	47%	Fair
2C	Southwest	45	54%	Fair
2D	Northwest	28	47%	Fair
2E	Central	12	39%	Fair
2F	Northwest	37	44%	Fair
2G	North Central	67	40%	Poor
3A	North Central	18	58%	Fair
3B	Northeast	47	60%	Good
3C	Northeast	26	55%	Fair
3D	Northeast	34	44%	Fair
4A	South Central	24	57%	Fair
4B	South Central	25	55%	Fair
4C	Northeast	20	47%	Fair
4D	Central	24	37%	Fair
4E	Central	14	57%	Fair
5A	South Central	6	57%	Fair
5B	Southeast	9	33%	Fair
5C	Southeast	12	26%	Fair
5D	Philadelphia Metro	0	0%	N/A

5. Create the appropriate relationships for the following tables. Do not enforce referential integrity.

a. *Counties* and *WMU*

b. *Counties* and *AnnualData*

c. *WMU* and *AnnualData*

6. Create separate queries to provide the information requested below. Name each query after the step in which it appears (e.g., name the query in Step 6a as *Query6A*).

HINT: Run your queries to test them. Make sure that they display all and only the records that you would expect to appear.

a. Create a query to display information on the counties in Pennsylvania. List each county's name, its associated WMUs and their region.

Sort by county name in ascending order.

HINT: This query will show 146 records and 3 fields.

b. We wish to display information on the WMUs. Create a query listing the region, WMU, health, year, licenses, and firearm harvest.

Only display records for the year 2012.

Sort by region and then by WMU, both in ascending order.

HINT: This query will show 22 records and 6 fields.

c. Create a query to understand hunting licenses in the North Central region and other WMUs with fair health. List the WMU, region, health, year, regeneration rate, and licenses issued.

Only display records for the North Central region or where the WMU health was fair.

Sort by WMU and then by year, both in ascending order.

HINT: This query will show 100 records and 6 fields.

d. We wish to know the percentage of licenses that were used to harvest a deer. Create a query listing the WMU, region, year, and licenses issued. Also, include a field that calculates the percentage of licenses used.

You can calculate the percentage of licenses used using the formula:
$$\frac{([AnnualData.FirearmHarvest] + [AnnualData.ArcheryHarvest])}{[AnnualData.LicensesIssued]}$$

Format the calculated field as a percentage with no decimal places.

HINT: This query will show 110 records and 5 fields.

e. Create a query to display the number of deer harvested in each WMU in 2012. List the year, WMU, region, number of deer harvested by firearms, and the number of deer harvested by archery. Also, include a field that calculates the percentage of deer harvested by firearms.

You can calculate the percentage of deer harvested by firearms using the formula:

$$\frac{[AnnualData.FirearmHarvest]}{([AnnualData.FirearmHarvest] + [AnnualData.ArcheryHarvest])}$$

Only display records for the year 2012.

Format the calculated field as a percentage with no decimal places.

HINT: This query will show 22 records and 6 fields.

f. We wish to summarize annual data about deer hunting. Create a query listing, for each year, the sum of deer harvested by firearms, the sum of deer harvested by archery, and the sum of licenses issued.

Format the sums as standard-type numbers with no decimal places.

HINT: This query will show 5 records and 4 fields.

g. We want to explore the health and regeneration rates of the WMUs in each region. Copy-and-paste this SQL code into a new query:

```
SELECT WMU.Region, WMU.Health, Count(WMU.WMU) AS CountOfWMU,
Avg(WMU.RegenerationRate) AS AvgOfRegenerationRate
FROM WMU
GROUP BY WMU.Region, WMU.Health;
```

IMPORTANT: Do not make any modifications to the query other than entering the above SQL code.

HINT: This query will show 11 records and 4 fields.

7. We need to create a new table to store analysis questions responses.

a. Create a table named *AnalysisQuestions* with the fields below. Use appropriate field types and designate a good primary key.

Table: *AnalysisQuestions*	
Field Name	**Description**
QuestionNumber	Question being answered.
Response	Response to the analysis question prompt.

8. In the *AnalysisQuestions* table, answer four of the five analysis questions below. Respond to one question per record.

    a. Are there any noticeable patterns in the type of hunting used in the various parts of the state? Why might this be the case?

    b. Why might Pennsylvania want to specifically limit the number of female deer harvested?

    c. Suppose that too many deer are being harvested. In the short run, this would allow hunters to take more deer and landowners would benefit from reduced amounts of crop damage. What might be longer-term consequences of overharvesting deer?

    d. Are there any trends in where a WMU is located and how many deer are harvested? Provide a possible explanation for any trends or lack thereof.
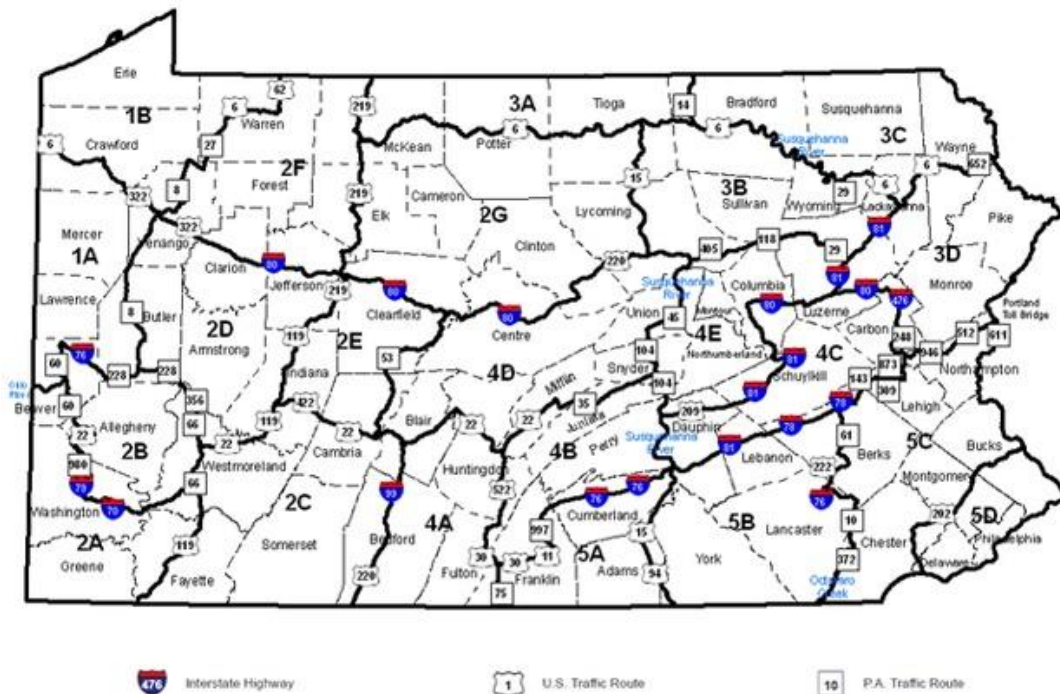
    e. The Pennsylvania Game Commission switched from managing the deer population on the basis of counties to the basis of Wildlife Management Units. There are fewer WMUs than counties, making each management area larger, but the WMUs are organized by grouping geographically similar areas. What might be some advantages and disadvantages to this change?

9. Run the Compact and Repair Database utility on your database. Ignore any errors you receive when running the utility.

Grading Rubric

This assignment is worth 50 points. It will be graded by your instructor using this rubric, with partial credit awarded as appropriate:

Step 3	3 points	Steps 6a-g	4 points each
Steps 4a-b	4 points total	Step 7a	2 points
Step 5	3 points	Steps 8a-e (pick 4 of 5)	2.5 points each

The analysis questions in Steps 8a-e will be evaluated using this rubric:

Standard	Meets Requirements (1.25 points)	Does Not Meet Requirements (0 points)
Answer is reasonable.	Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.	Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.
Answer is supported.	Logical rationale is provided to support the given answer.	Logical rationale is not provided to support the given answer.

Acknowledgments

The image in the introduction appears courtesy of the U.S. Fish and Wildlife Service [6].

The map of Wildlife Management Units appears courtesy of the Pennsylvania Game Commission [7].

References

[1] "Wildlife Management Units," Pennsylvania Game Commission. Available: http://www.portal.state.pa.us/portal/server.pt?open=514&objID=619923&mode=2.

[2] "Harvest Data and Maps," Pennsylvania Game Commission. Available: http://www.portal.state.pa.us/portal/server.pt/community/harvest_data/18682.

[3] "Pa. Game Commission finalizes antlerless deer permits for 2012-13," Lehigh Valley Wild, Apr. 24, 2012. Available: http://blogs.mcall.com/outdoors/2012/04/pa-game-commission-finalizes-antlerless-deer-permits-for-2012-13-see-how-many.html.

[4] "Most antlerless allocations reduced in PA," Deer & Deer Hunting Forums, Apr. 20, 2010. Available: http://www.deeranddeerhunting.com/forum/viewtopic.php?f=81&t=711.

[5] "Deer Health, Forest Habitat Health, Deer Harvests, and Deer Population Trends by Wildlife Management Unit," Pennsylvania Game Commission, Jun. 2013.

Available:
https://www.portal.state.pa.us/portal/server.pt/document/1371385/21001-12z_pdf.

[6] U.S. Fish and Wildlife Service, White-tailed deer (Odocoileus virginianus). 2002. Available: https://commons.wikimedia.org/wiki/File:Wtdfishwild.jpg.

[7] "Pennsylvania Wildlife Management Units Map," Pennsylvania Game Commission, Harrisburg, Pennsylvania. Available: http://www.wgal.com/image/view/-/17474604/highRes/3/-/maxh/480/maxw/640/-/alqwec/-/Wildlife-management-units.jpg.