# CPSC 304 Project Cover Page

Milestone #: 4

Date: 2025-04-02

Group Number: 9

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By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

**GIT LINK:**
https://github.students.cs.ubc.ca/CPSC304-2024W-T2/project_c0j6d_c2m4x_g0x9q

**SQL SCRIPT CAN BE FOUND IN THE PATH:**
project_c0j6d_c2m4x_g0x9q/CPSC304_Node_Project-main/biome.sql

## 2. Summary:

The application aims to model the biotic and abiotic components of different bioregions, called biomes, in British Columbia and how they interact. Formally, a biome is a community of flora and fauna that occupies a major habitat, with examples including the biomes Tundra, Temperate Rainforest, etc. Our application includes entities under this umbrella such as organisms, climate, and soil type, and relationships such as how a spanning geographic barrier can result in speciation (separation of species) within these biomes. The final project allows users to observe the relationship between multiple attributes present in biomes, such as the relationship between temperature and precipitation, and many other biotic and abiotic factors.

Visitors can view tables and their data in a clean, easy to read format and query the data through a user-friendly interface. In addition, they can also choose to manipulate some table data by adding, deleting, and or updating data values using buttons. This allows users from all backgrounds of education to be able to interact with and access information about the biomes of British Columbia.

## 3. Changes

- **Change:** All "VARCHAR" domains got changed to  "VARCHAR(255)"
- **Why:** Length specification is required for VARCHAR in ORACLE, and our previous CREATE TABLE statements failed to define this.

- **Change:** Added "ON DELETE CASCADE" every time a primary key in a table is a foreign key referencing another table.
- **Why:** Feedback for milestone 3 pointed out that "most of [our] tables do not contain on update/delete conditions". As ORACLE does not support ON UPDATE CASCADE, we added ON DELETE CASCADE where possible.

- **Change:** All "BOOLEAN" domains got changed to number(1)
- **Why:** ORACLE does not support BOOLEAN, thus it is represented in a logical way.

- **Change:** Changed Vascularization char(10) to char(11)  in VascularizationInPlants
- **Why:** Nonvascular is 11 characters and is a legal input for Vascularization

- **Change:** In TemperaturesOfBiomes, changed BiomeName to Name
- **Why:** A lot of foreign key references had stated TemperatureOfBiomes(Name, Temperature) and to avoid shotgun surgery, it was easier to change the source name.

**4. A list of all SQL queries used to satisfy the rubric items and where each query can be found in the code (file name and line number(s)).**

INSERT:

**Query:**

```
INSERT INTO HumidityAndCloudCoverage (Humidity, CloudCoverage)
        VALUES (:humidity, :cloudCoverage);
```

**File:** appService.js

**Lines:** 239-240

**Query:**

```
INSERT INTO TempPrecipitationHumidity (Temperature, Precipitation,
Humidity) VALUES (:temperature, :precipitation, :humidity)
```

**File:** appService.js

**Lines:** 388-389

UPDATE:

**Query (SHOWS USE OF UPDATE IN QUERY):**

```
UPDATE HumidityAndCloudCoverage
SET CloudCoverage=:newCC
WHERE humidity = :humidity
```

**File:** appService.js

**Lines:** 776-778

**Query (MANUAL FOREIGN KEY UPDATE TO MEET ALL REQUIREMENTS):**

```
SELECT *
FROM TempPrecipitationHumidity
WHERE temperature = :temp AND precipitation = :prec AND humidity =
:oldHumidity;
```

*(Purpose: Ensures that the tuple being updated in the table already exists)*

```
DELETE FROM TempPrecipitationHumidity where temperature =:temp
AND precipitation = :prec AND humidity = :oldHumidity;
```

*(Purpose: Deletes the tuple from the child table as ORACLE will not allow update of attributes that reference another table otherwise)*

INSERT INTO TempPrecipitationHumidity (Temperature, Precipitation, Humidity) VALUES (:temperature, :precipitation, :newHumidity);
*(Purpose: Inserts the tuple with the updated humidity value back into the table)*

**File:** appService.js
**Lines:** 723-744

**Important Note:** In order to UPDATE a foreign key as required, we had to delete the queries from the child table to avoid the SQL error that the tuples can not be updated as it is referencing a parent table. We then inserted the tuple with the new value back to show that the foreign humidity value in TempPrecipitationHumidity can be updated to an EXISTING value in HumidityAndCloudCoverage. In this manual recreation due to ORACLE restrictions, no actual UPDATE query was called but the changes perform as expected through these sequential queries. As no actual UPDATE statement was required for our table with 2 non-primary keys with one being a foreign key referencing another relation, we added another more simple UPDATE, in which the attribute is NOT foreign, this is the update for CloudCoverage, in which an actual UPDATE query is sent to the database. This way, we demonstrated that we are able to use UPDATE queries but also perform manual UPDATE for attributes referencing foreign keys while meeting the project requirements.

DELETE:

**Query:**
DELETE FROM HumidityAndCloudCoverage
WHERE humidity = :humidity

**File:** appService.js
**Lines:** 405-406

SELECTION:

**Query:** SELECT ${attributes} FROM HumidityAndCloudCoverage WHERE ${clause}

**File:** appService.js
**Line:** 663-676
**Description:** This query takes user-selected attributes from HumidityAndCloudCoverage and a clause the user inputted into the interface. Users can create any number of clauses that are equality

comparisons between a specified value and any attributes in HumidityAndCloudCoverage, as well use an arbitrary number of AND/ORs.

PROJECTION:

**Query:**

```
SELECT ${all_attributes}
FROM EnvironmentalDamageCausedByNaturalDisasters
NATURAL JOIN NaturalDisastersOccurrencesInBC
```

*(Purpose: In which all_attributes is the columns the user chose to project)*

**File:** appService.js
**Lines:** 643-645

JOIN:

**Query:**

```
SELECT AnimalScientificName, v.hasVertebrae, circulationSystem
FROM VertebratesAndInvertebrates v, CirculationSystemsOfVertebrates c
WHERE v.hasVertebrae = c.hasVertebrae AND c.hasVertebrae =
:hasVertebrae
```

**File:** appService.js
Lines: 420-423

AGGREGATION WITH GROUP BY:

**Query:**

```
SELECT CommunityType, COUNT(CityName)
        FROM CitiesAndCommunityTypes
        WHERE UPPER(CommunityType) = UPPER(:communityType)
        GROUP BY CommunityType
```

**File:** appService.js
Lines: 831-834
Description: This query takes user inputted community types like urban or rural to and then counts the number of cities in that community type.

AGGREGATION WITH HAVING:

**Query:**

```
 SELECT tph.Humidity, AVG(tph.Temperature)
        FROM TempPrecipitationHumidity tph
        WHERE tph.Humidity > :humidity
        GROUP BY tph.Humidity
        HAVING AVG(tph.Temperature) > :temperature
```

**File:** appService.js
Lines: 802-807
Description: This query takes user inputs for both temperature and humidity. It then groups the data by the humidities which are greater than the user input. Then selects the groups where the average temperatures are greater than the user input.

NESTED AGGREGATION WITH GROUP BY:

**Query:**

```
SELECT tph.Precipitation, AVG(CloudCoverage)
        FROM TempPrecipitationHumidity tph
        JOIN HumidityAndCloudCoverage h ON tph.Humidity = h.Humidity
        GROUP BY tph.Precipitation
        HAVING AVG(h.CloudCoverage) <= ALL(
                SELECT AVG(h2.CloudCoverage)
                FROM  HumidityAndCloudCoverage h2
                GROUP BY h2.Humidity)
```

**File:** appService.js
**Lines:** 698-714
**Description:** This query performs a join on TempPrecipitationHumidity and HumidityAndCloudCoverage. Additionally, it groups all tuples by precipitation values and returns the values of precipitation and the corresponding average cloud coverage such that it is minimum over the average of all cloud coverages.

DIVISION:

**Query:**

```
SELECT DISTINCT CC.CityName
FROM CitiesAndCommunityTypes CC
```

```
WHERE NOT EXISTS (SELECT YearOfMostRecentOccurence FROM
NaturalDisastersOccurrencesInBC MINUS SELECT
YearOfMostRecentOccurence FROM NaturalDisastersOccurrencesInBC CN
WHERE CN.CityName = CC.CityName)
```

**File:** appService.js
**Lines:** 624-628
**Description:** The query performs division by first finding all the DISTINCT years present in the table, and then subtracts the years that a natural disaster occurred for each city. If a city has had a natural disaster every year for each year present in the table, then the NOT EXISTS clause evaluates to be TRUE and the city's name is returned. Thus, this query finds the names of the cities that had a natural disaster for every year recorded in the NaturalDisastersOccurrencesInBC table.

## 5. IMPORTANT NOTES:

- GitHub Issues
    - I (tquinton) was having issues with the remote server and so I was committing locally, but then there were issues with copying code over so I decided to start committing remotely (mostly to my tempe-new-branch but a couple times to main) and my username didn't appear, but I didn't realize til after i committed a few times. The few commits to main happened because when I cloned it didn't keep my username so I had to reconfigure the git file each time. But, I was the only one having this issue so I'm the only UBC Student that committed. When we asked our instructor (Seva) about it he said it should be fine since I was the only one having this issue and because most of the UBC Student commits were on my personal branch.
    - I (ddavi01) sometimes committed through my local repository due to difficulties connecting to SSH but quickly reverted back. The commits are still in my name (dilnadavi) and thus it is easy to tell that the commits belong to me. This issue has been raised to multiple TA's and was excused as the commit can still be traced back to me.

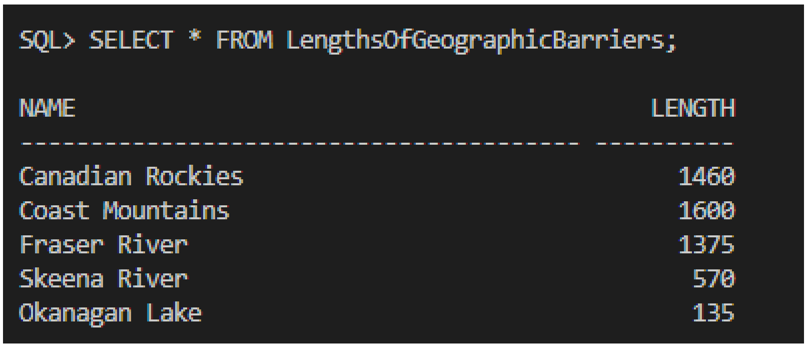
## 6. SQL SCRIPT AND RELATION SCREENSHOTS AND SCHEMAS:

**SCHEMAS:**

- LengthsOfGeographicBarriers(GeographicBarrierName, Length)
- HumidityAndCloudCoverage(Humidity, CloudCoverage)
- TempPrecipitationHumidity(Temperature, Precipitation, **Humidity**)
- TemperaturesOfBiomes(**Name**, Temperature)
- PrecipitationOfBiomes(**BiomeName**, Precipitation)
- BiomeAndType(BiomeName, isTerrestrial)
- OxygenConcentrationAndRedox(OxygenConcentration, redoxPotential)
- SoilAndOxygenConcentration(SoilType, **OxygenConcentration**)
- CitiesAndCommunityTypes(CityName, CommunityType)
- DensitiesOfGeologicalCommodities(GeologicalCommoditiesName, Density)
- DistributionOfGeologicalCommodities(**GeologicalCommoditiesName**, **CityName**, LevelOfAbundance)
- AnimalsAndSourcesOfEnergy(AnimalScientificName, SourceofEnergy)
- PlantsAndTheirSourcesOfEnergy(PlantScientificName, SourceofEnergy)
- ReproductionInPlantPhylums(Phylum, Reproduction)
- VascularizationInPlants(**Phylum**, Vascularization)
- PlantSpeciesAndTheirPhylums(PlantScientificName, **Phylum**)
- CirculationSystemsOfVertebrates(hasVertebrae, circulationSystem)
- VertebratesAndInvertebrates(AnimalScientificName, **hasVertebrae**)
- EnvironmentalDamageCausedByNaturalDisasters(NaturalDisasterType, CityName, AreaDamaged)
- NaturalDisastersOccurrencesInBC(**NaturalDisasterType**, **CityName**, YearOfMostRecentOccurence)
- EcosystemsInBC(**GeographicBarriersName**, **BiomeName**, **SoilType**, **AnimalScientificName**, **PlantScientificName**, **GeologicalCommoditiesName**, **CityName**, **NaturalDisastersType**)

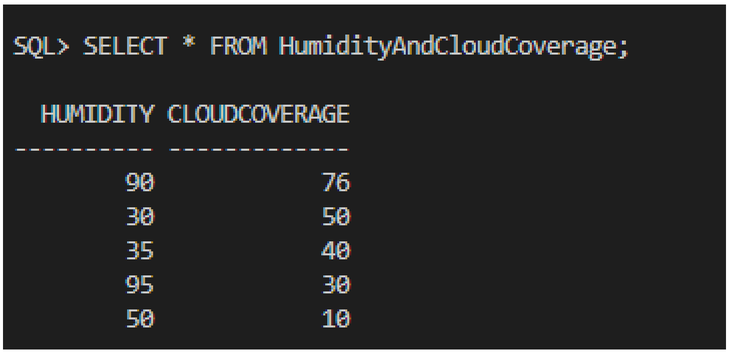
## RELATIONAL SCHEMA SCREENSHOTS:

LengthsOfGeographicBarriers:



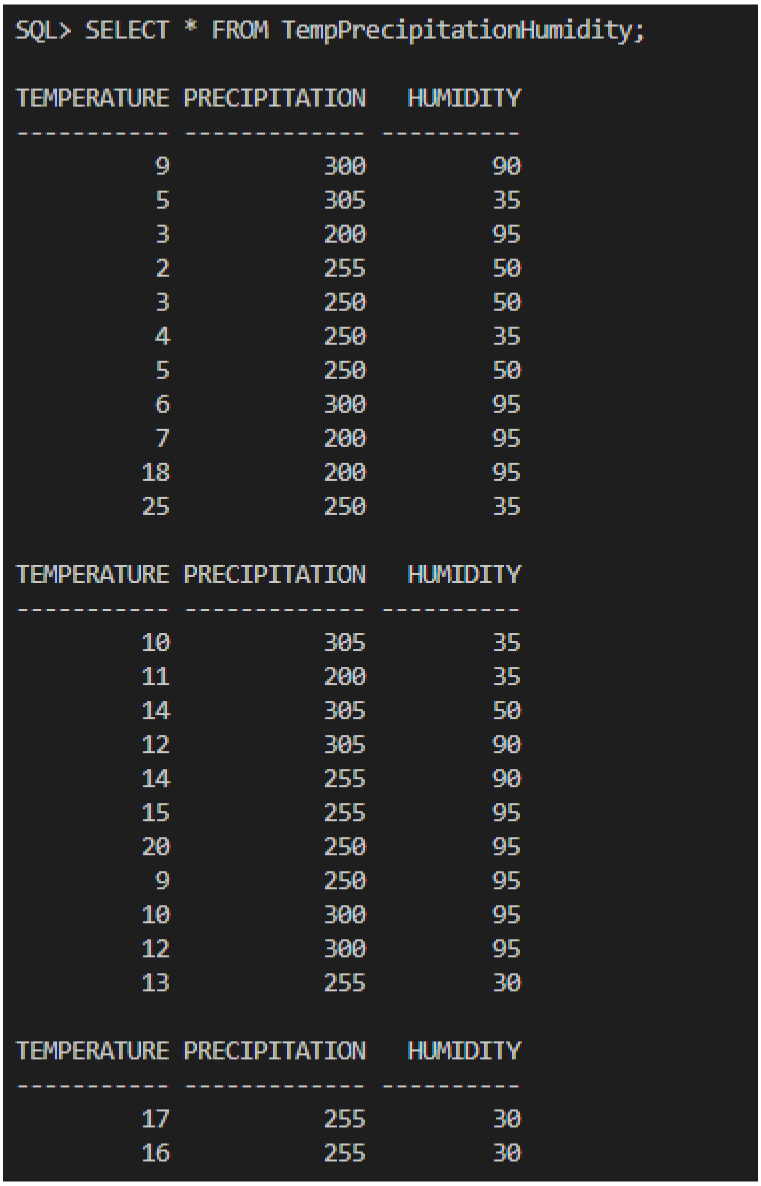
```
SQL> SELECT * FROM LengthsOfGeographicBarriers;

NAME                                         LENGTH
---------------------------------------- ----------
Canadian Rockies                               1460
Coast Mountains                                1600
Fraser River                                   1375
Skeena River                                    570
Okanagan Lake                                   135
```

HumidityAndCloudCoverage:



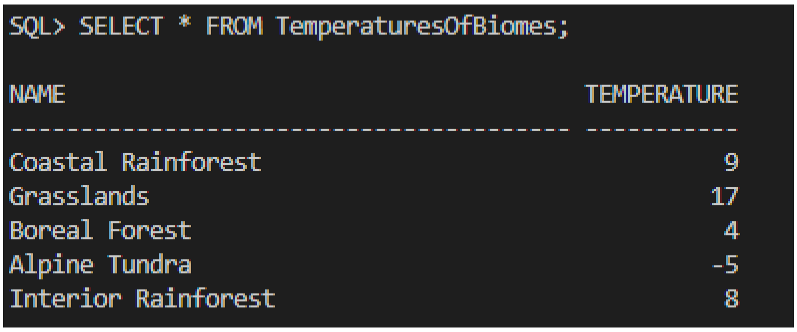
```
SQL> SELECT * FROM HumidityAndCloudCoverage;

  HUMIDITY CLOUDCOVERAGE
---------- -------------
        90            76
        30            50
        35            40
        95            30
        50            10
```

TempPrecipitationHumidity:



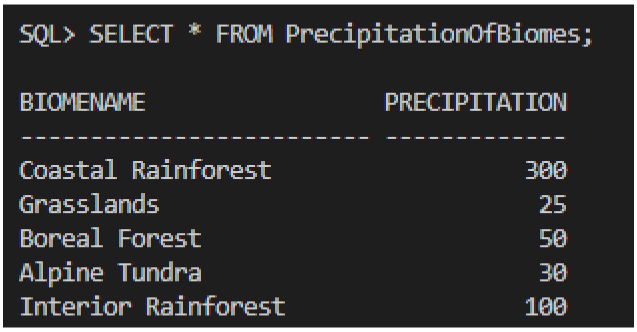
```
SQL> SELECT * FROM TempPrecipitationHumidity;

TEMPERATURE PRECIPITATION   HUMIDITY
----------- ------------- ----------
          9           300         90
          5           305         35
          3           200         95
          2           255         50
          3           250         50
          4           250         35
          5           250         50
          6           300         95
          7           200         95
         18           200         95
         25           250         35

TEMPERATURE PRECIPITATION   HUMIDITY
----------- ------------- ----------
         10           305         35
         11           200         35
         14           305         50
         12           305         90
         14           255         90
         15           255         95
         20           250         95
          9           250         95
         10           300         95
         12           300         95
         13           255         30

TEMPERATURE PRECIPITATION   HUMIDITY
----------- ------------- ----------
         17           255         30
         16           255         30
```

TemperaturesOfBiomes:



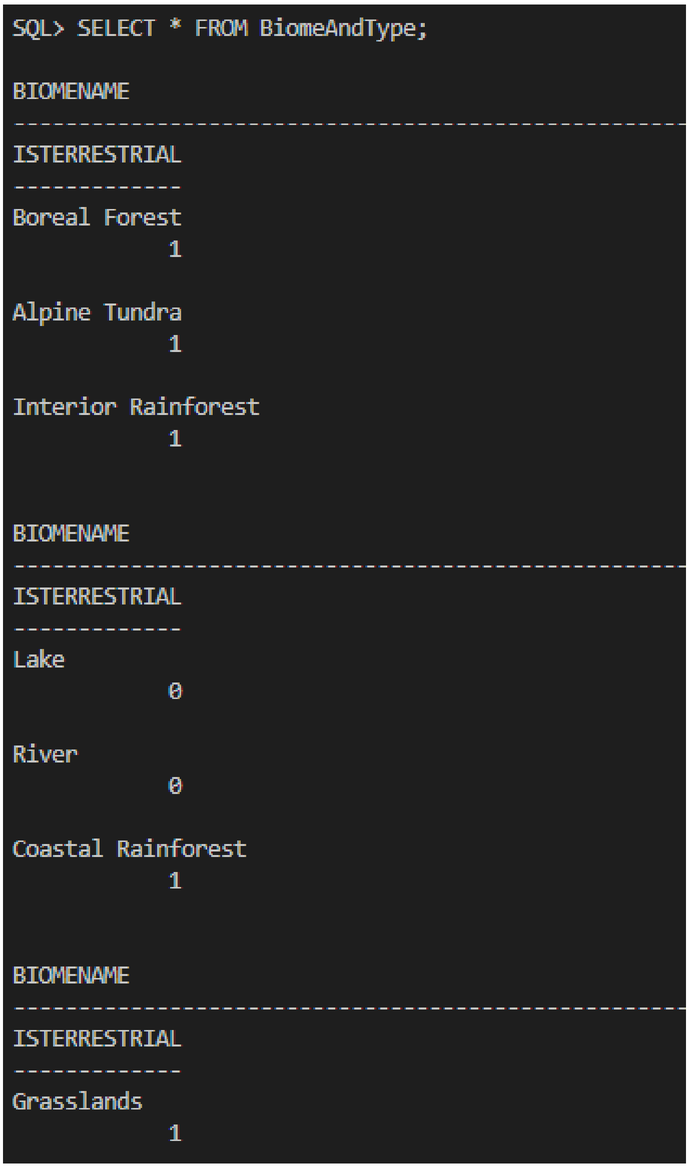
```
SQL> SELECT * FROM TemperaturesOfBiomes;

NAME                                     TEMPERATURE
---------------------------------------- -----------
Coastal Rainforest                                 9
Grasslands                                        17
Boreal Forest                                      4
Alpine Tundra                                     -5
Interior Rainforest                                8
```

PrecipitationOfBiomes:



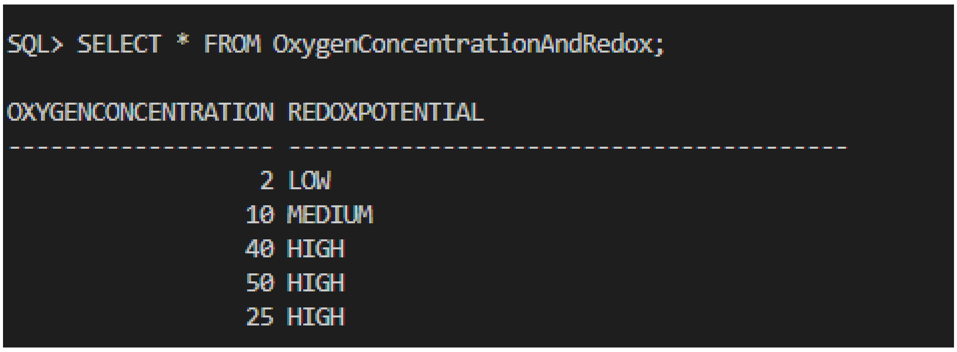
```
SQL> SELECT * FROM PrecipitationOfBiomes;

BIOMENAME                 PRECIPITATION
------------------------- -------------
Coastal Rainforest                  300
Grasslands                           25
Boreal Forest                        50
Alpine Tundra                        30
Interior Rainforest                 100
```

BiomeAndType:



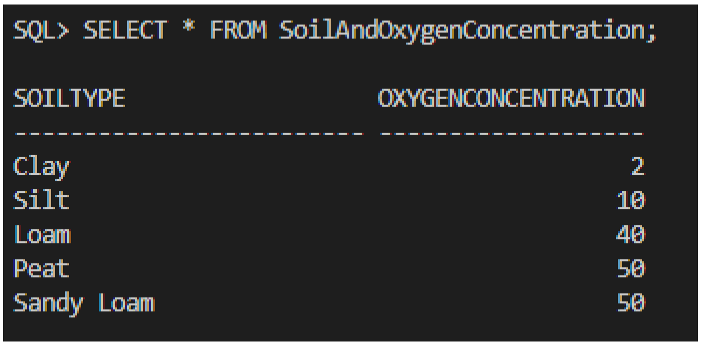
```
SQL> SELECT * FROM BiomeAndType;

BIOMENAME
----------------------------------------------------
ISTERRESTRIAL
-------------
Boreal Forest
            1

Alpine Tundra
            1

Interior Rainforest
            1


BIOMENAME
----------------------------------------------------
ISTERRESTRIAL
-------------
Lake
            0

River
            0

Coastal Rainforest
            1


BIOMENAME
----------------------------------------------------
ISTERRESTRIAL
-------------
Grasslands
            1
```

OxygenConcentrationAndRedox:



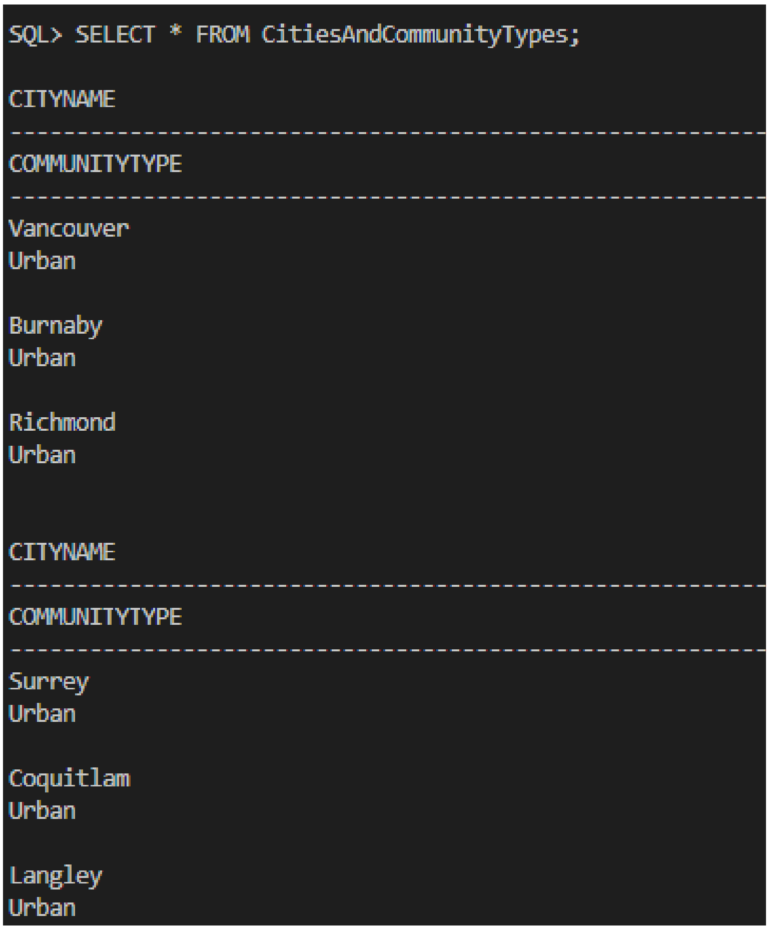
```
SQL> SELECT * FROM OxygenConcentrationAndRedox;

OXYGENCONCENTRATION REDOXPOTENTIAL
------------------- ----------------------------------------
                  2 LOW
                 10 MEDIUM
                 40 HIGH
                 50 HIGH
                 25 HIGH
```

SoilAndOxygenConcentration:

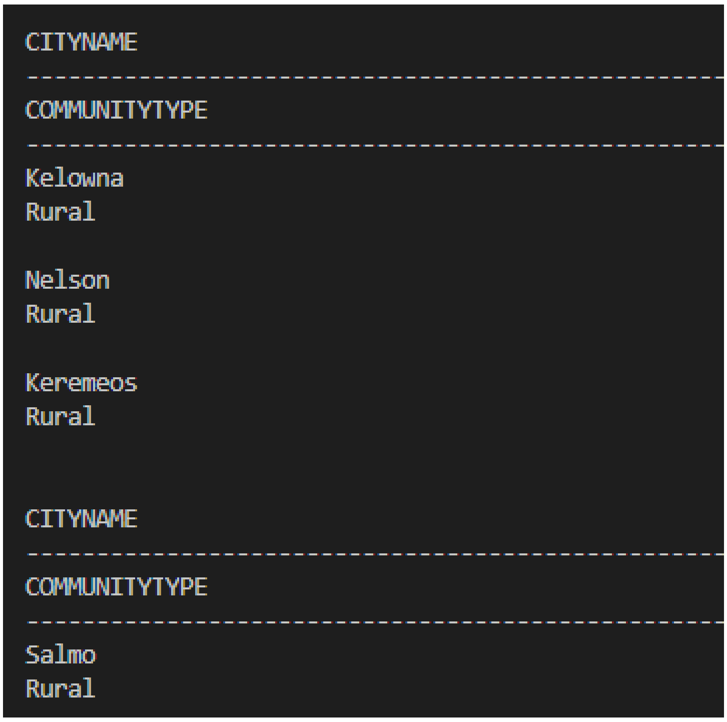


```
SQL> SELECT * FROM SoilAndOxygenConcentration;

SOILTYPE                  OXYGENCONCENTRATION
------------------------- -------------------
Clay                                        2
Silt                                       10
Loam                                       40
Peat                                       50
Sandy Loam                                 50
```

CitiesAndCommunityTypes:

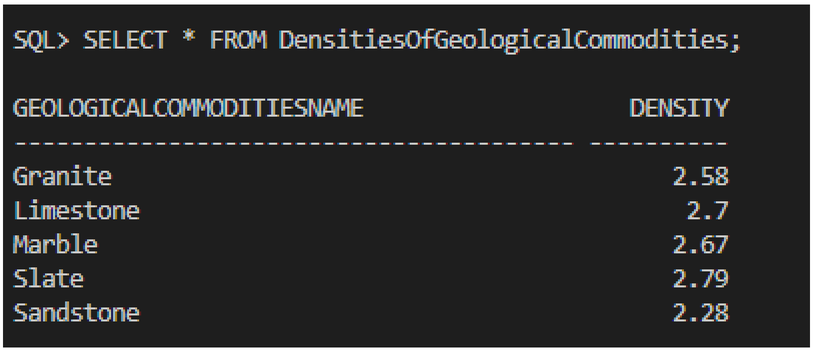


```
SQL> SELECT * FROM CitiesAndCommunityTypes;

CITYNAME
--------------------------------------------------------
COMMUNITYTYPE
--------------------------------------------------------
Vancouver
Urban

Burnaby
Urban

Richmond
Urban


CITYNAME
--------------------------------------------------------
COMMUNITYTYPE
--------------------------------------------------------
Surrey
Urban

Coquitlam
Urban

Langley
Urban
```



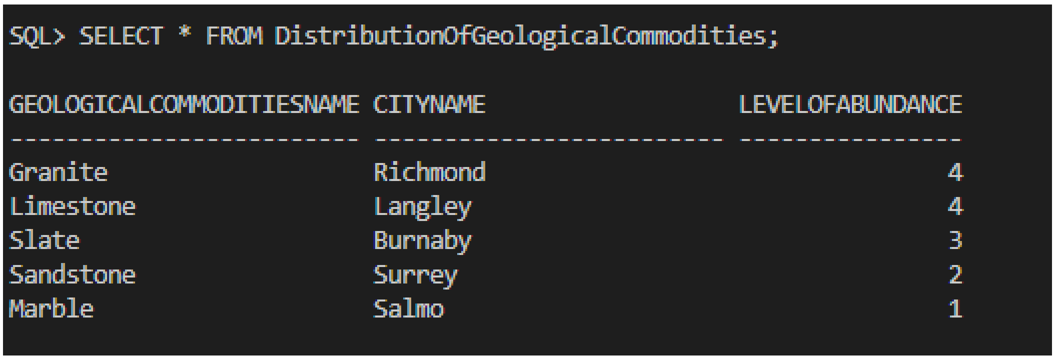
```
CITYNAME
--------------------------------------------------
COMMUNITYTYPE
--------------------------------------------------
Kelowna
Rural

Nelson
Rural

Keremeos
Rural


CITYNAME
--------------------------------------------------
COMMUNITYTYPE
--------------------------------------------------
Salmo
Rural
```

DensitiesOfGeologicalCommodities:



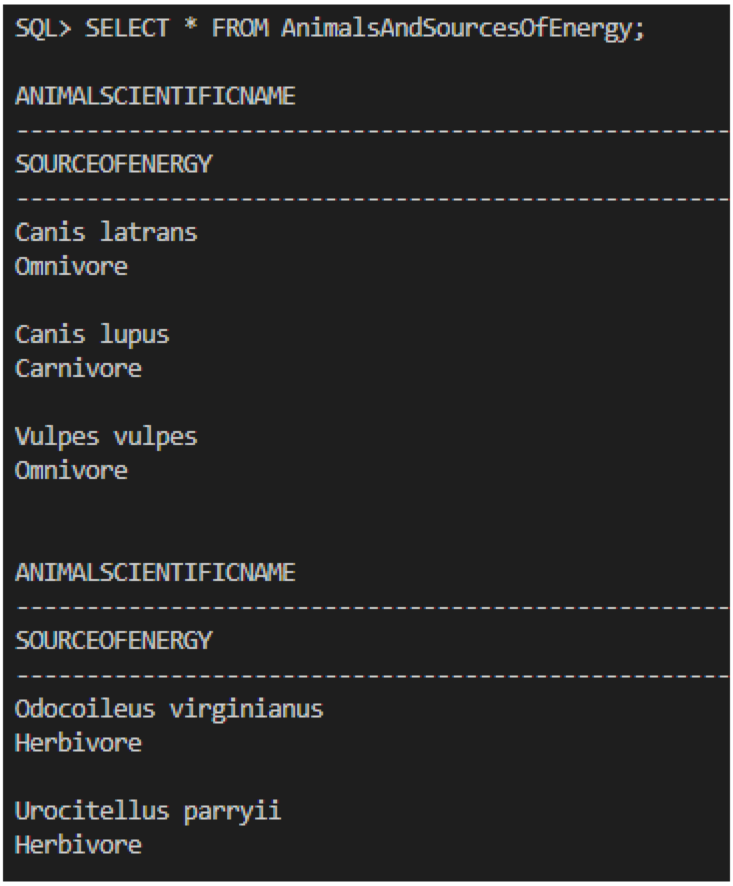
```
SQL> SELECT * FROM DensitiesOfGeologicalCommodities;

GEOLOGICALCOMMODITIESNAME                   DENSITY
---------------------------------------- ----------
Granite                                        2.58
Limestone                                       2.7
Marble                                         2.67
Slate                                          2.79
Sandstone                                      2.28
```

DistributionOfGeologicalCommodities:



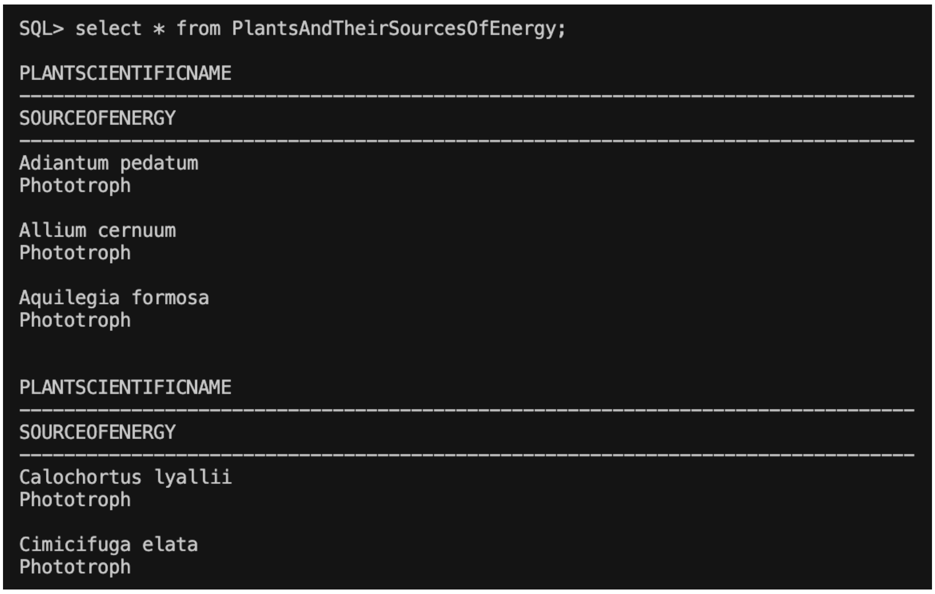
```
SQL> SELECT * FROM DistributionOfGeologicalCommodities;

GEOLOGICALCOMMODITIESNAME CITYNAME                  LEVELOFABUNDANCE
------------------------- ------------------------- ----------------
Granite                   Richmond                                 4
Limestone                 Langley                                  4
Slate                     Burnaby                                  3
Sandstone                 Surrey                                   2
Marble                    Salmo                                    1
```

AnimalsAndSourcesOfEnergy:



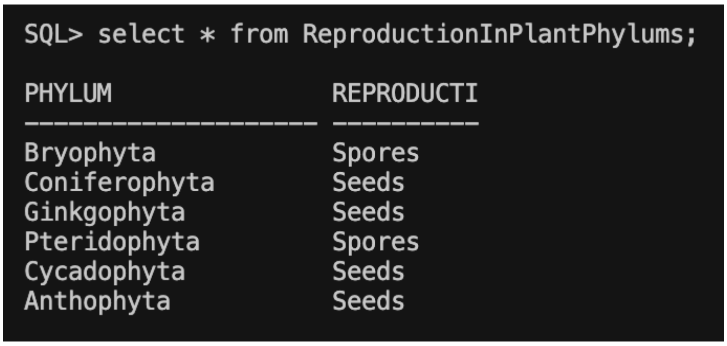
```
SQL> SELECT * FROM AnimalsAndSourcesOfEnergy;

ANIMALSCIENTIFICNAME
--------------------------------------------------
SOURCEOFENERGY
--------------------------------------------------
Canis latrans
Omnivore

Canis lupus
Carnivore

Vulpes vulpes
Omnivore


ANIMALSCIENTIFICNAME
--------------------------------------------------
SOURCEOFENERGY
--------------------------------------------------
Odocoileus virginianus
Herbivore

Urocitellus parryii
Herbivore
```

PlantsAndTheirSourcesOfEnergy:



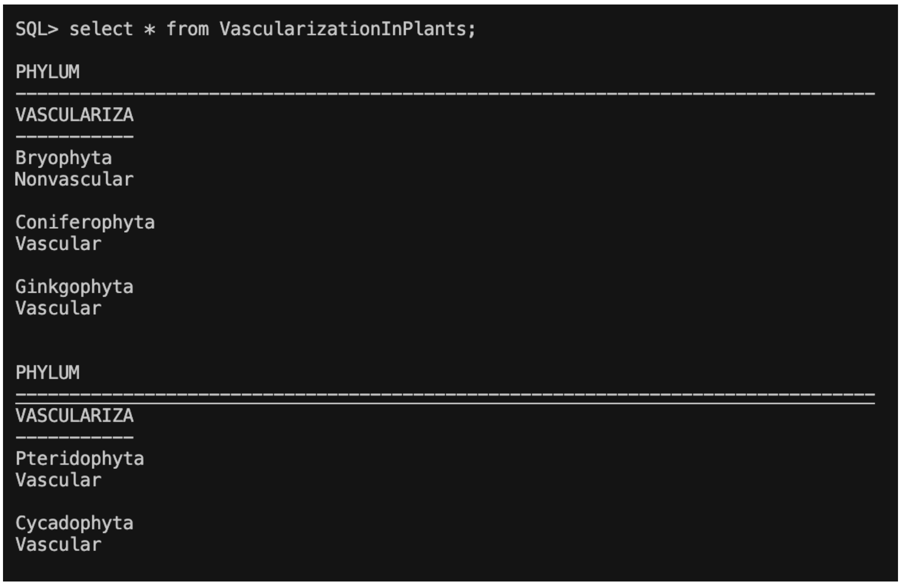
```
SQL> select * from PlantsAndTheirSourcesOfEnergy;

PLANTSCIENTIFICNAME
--------------------------------------------------------------------------------
SOURCEOFENERGY
--------------------------------------------------------------------------------
Adiantum pedatum
Phototroph

Allium cernuum
Phototroph

Aquilegia formosa
Phototroph


PLANTSCIENTIFICNAME
--------------------------------------------------------------------------------
SOURCEOFENERGY
--------------------------------------------------------------------------------
Calochortus lyallii
Phototroph

Cimicifuga elata
Phototroph
```

ReproductionInPlantPhylums:



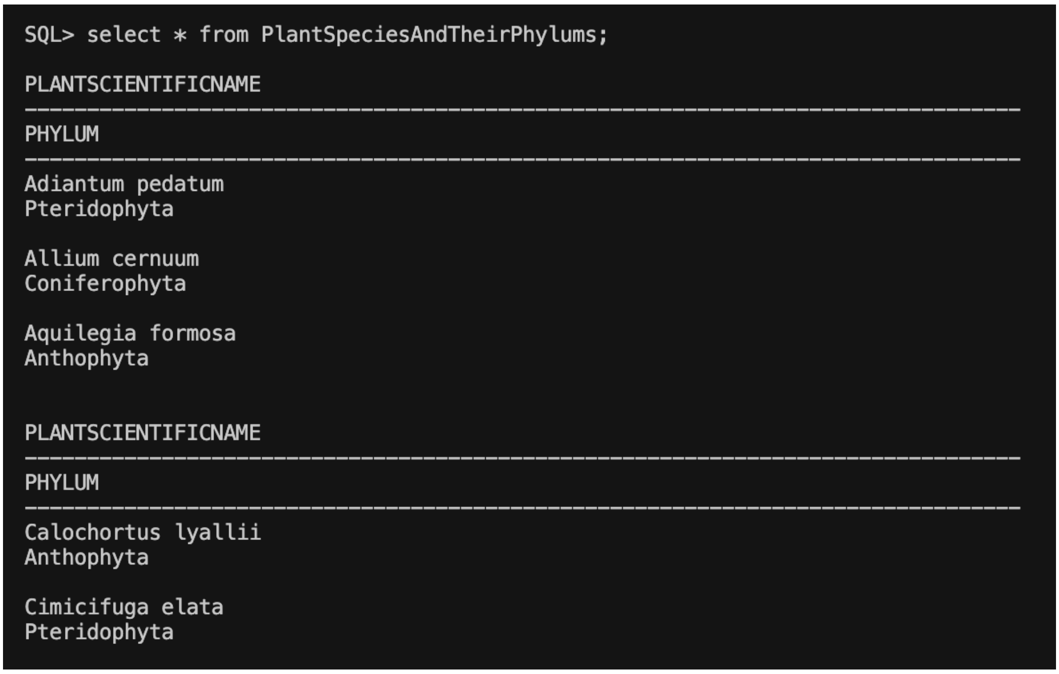
```
SQL> select * from ReproductionInPlantPhylums;

PHYLUM               REPRODUCTI
-------------------- ----------
Bryophyta            Spores
Coniferophyta        Seeds
Ginkgophyta          Seeds
Pteridophyta         Spores
Cycadophyta          Seeds
Anthophyta           Seeds
```

VascularizationInPlants:



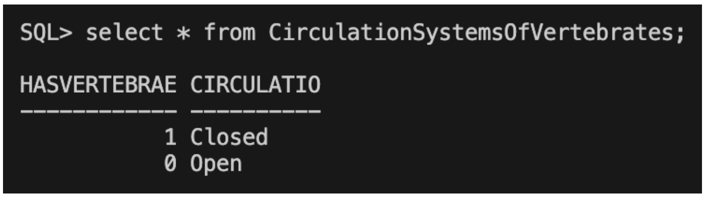
```
SQL> select * from VascularizationInPlants;

PHYLUM
--------------------------------------------------------------------------------
VASCULARIZA
-----------
Bryophyta
Nonvascular

Coniferophyta
Vascular

Ginkgophyta
Vascular


PHYLUM
--------------------------------------------------------------------------------
VASCULARIZA
-----------
Pteridophyta
Vascular

Cycadophyta
Vascular
```

PlantSpeciesAndTheirPhylums:



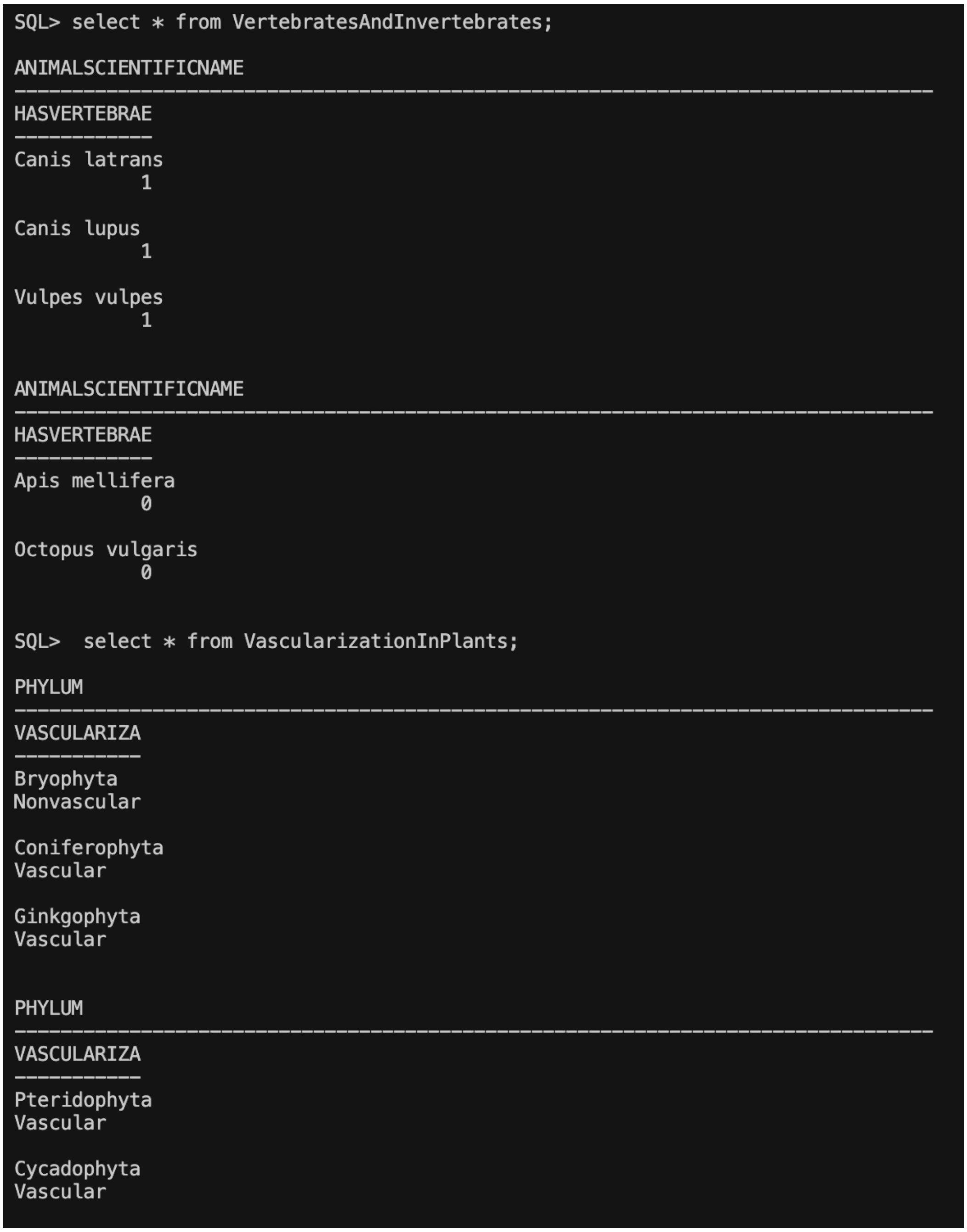
```
SQL> select * from PlantSpeciesAndTheirPhylums;

PLANTSCIENTIFICNAME
--------------------------------------------------------------------------------
PHYLUM
--------------------------------------------------------------------------------
Adiantum pedatum
Pteridophyta

Allium cernuum
Coniferophyta

Aquilegia formosa
Anthophyta


PLANTSCIENTIFICNAME
--------------------------------------------------------------------------------
PHYLUM
--------------------------------------------------------------------------------
Calochortus lyallii
Anthophyta

Cimicifuga elata
Pteridophyta
```

CirculationSystemsOfVertebrates:



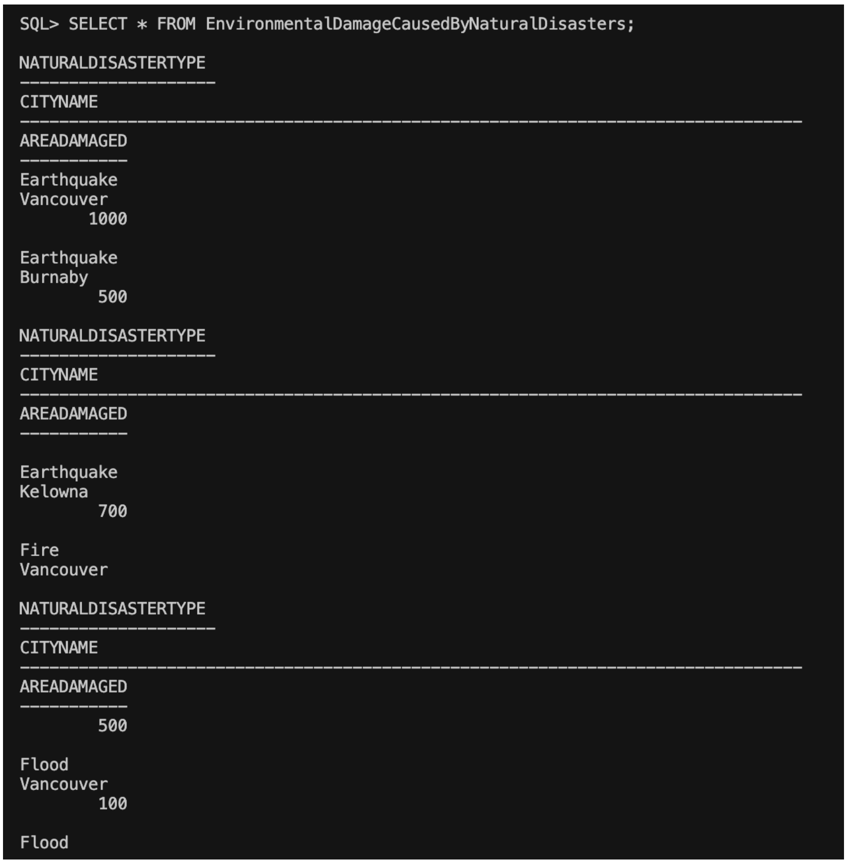
```
SQL> select * from CirculationSystemsOfVertebrates;

HASVERTEBRAE CIRCULATIO
------------ ----------
           1 Closed
           0 Open
```

VertebratesAndInvertebrates:

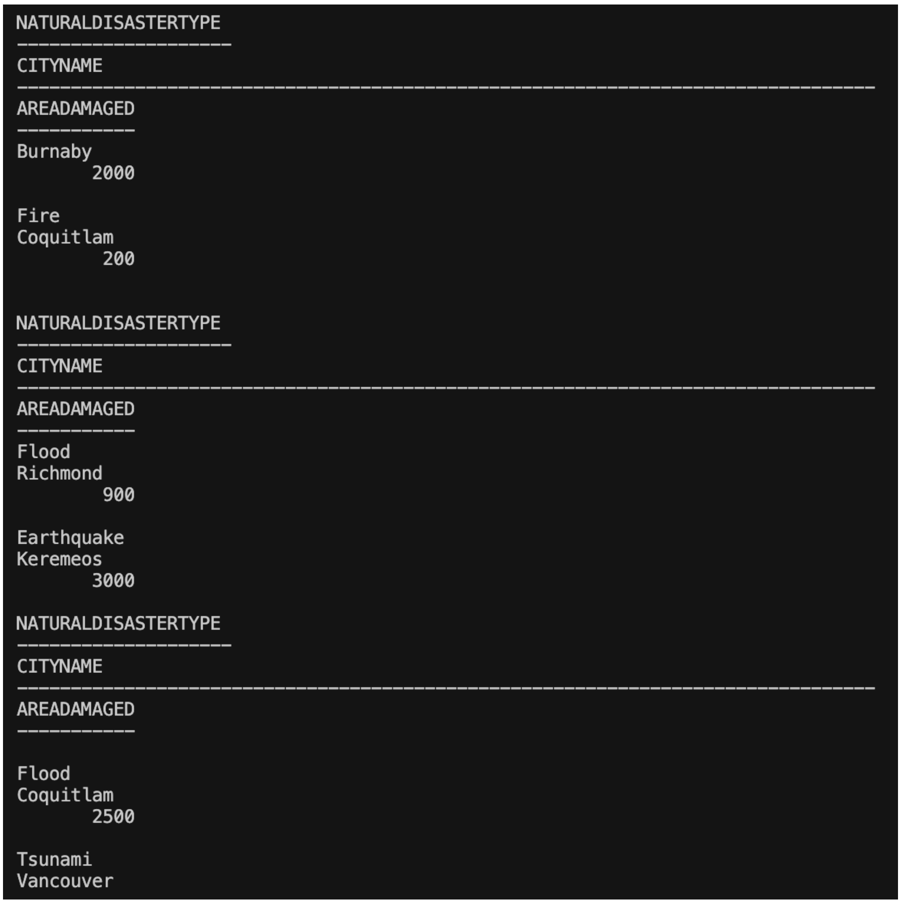


```
SQL> select * from VertebratesAndInvertebrates;

ANIMALSCIENTIFICNAME
--------------------------------------------------------------------------------
HASVERTEBRAE
------------
Canis latrans
           1

Canis lupus
           1

Vulpes vulpes
           1


ANIMALSCIENTIFICNAME
--------------------------------------------------------------------------------
HASVERTEBRAE
------------
Apis mellifera
           0

Octopus vulgaris
           0


SQL>  select * from VascularizationInPlants;

PHYLUM
--------------------------------------------------------------------------------
VASCULARIZA
-----------
Bryophyta
Nonvascular

Coniferophyta
Vascular

Ginkgophyta
Vascular


PHYLUM
--------------------------------------------------------------------------------
VASCULARIZA
-----------
Pteridophyta
Vascular

Cycadophyta
Vascular
```

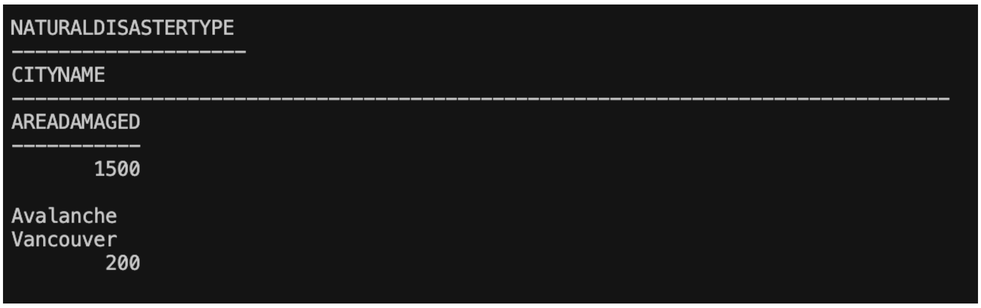
EnvironmentalDamageCausedByNaturalDisasters:



```
SQL> SELECT * FROM EnvironmentalDamageCausedByNaturalDisasters;

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------
Earthquake
Vancouver
       1000

Earthquake
Burnaby
        500

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------

Earthquake
Kelowna
        700

Fire
Vancouver

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------
        500

Flood
Vancouver
        100

Flood
```

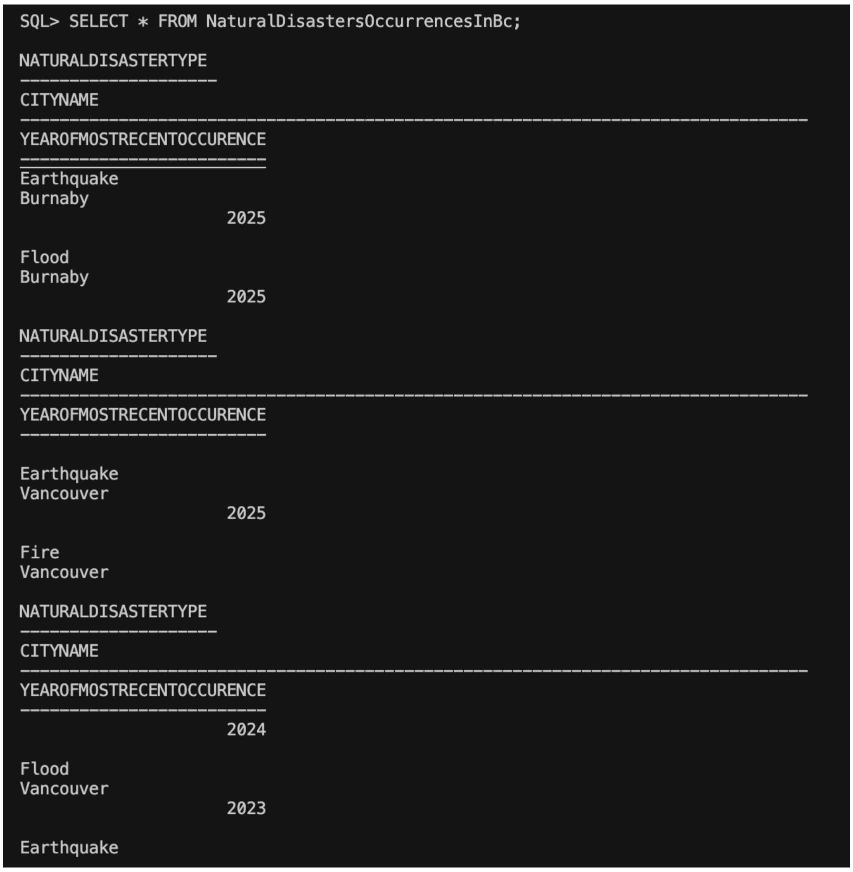


```
NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------
Burnaby
       2000

Fire
Coquitlam
        200


NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------
Flood
Richmond
        900

Earthquake
Keremeos
       3000

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------

Flood
Coquitlam
       2500

Tsunami
Vancouver
```

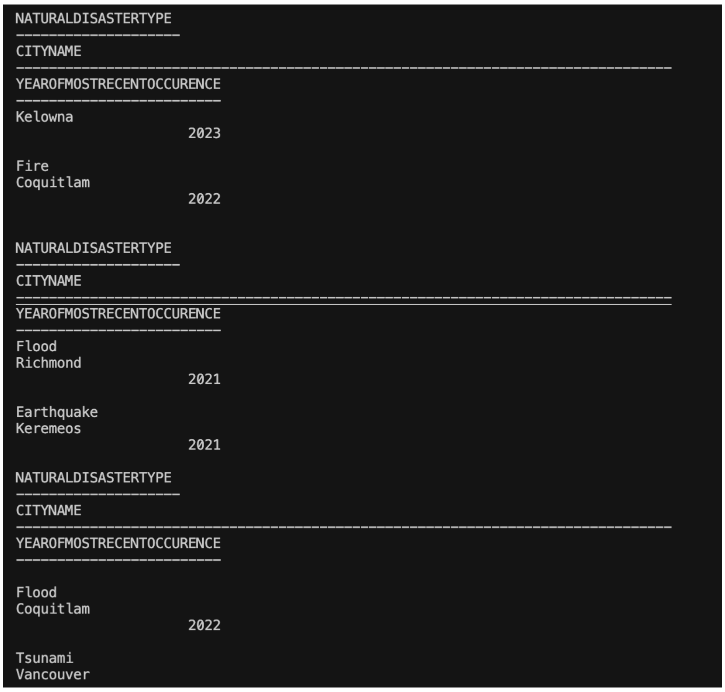


```
NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
AREADAMAGED
-----------
       1500

Avalanche
Vancouver
        200
```

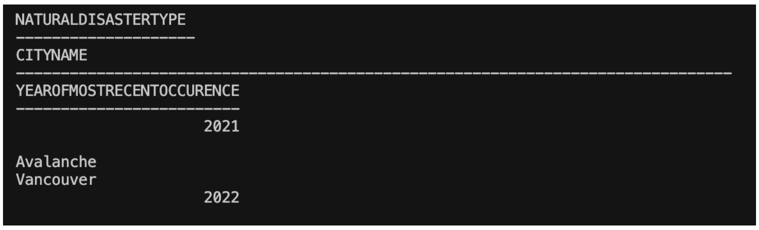
NaturalDisastersOccurrencesInBC:



```
SQL> SELECT * FROM NaturalDisastersOccurrencesInBc;

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------
Earthquake
Burnaby
                     2025

Flood
Burnaby
                     2025

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------

Earthquake
Vancouver
                     2025

Fire
Vancouver

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------
                     2024

Flood
Vancouver
                     2023

Earthquake
```

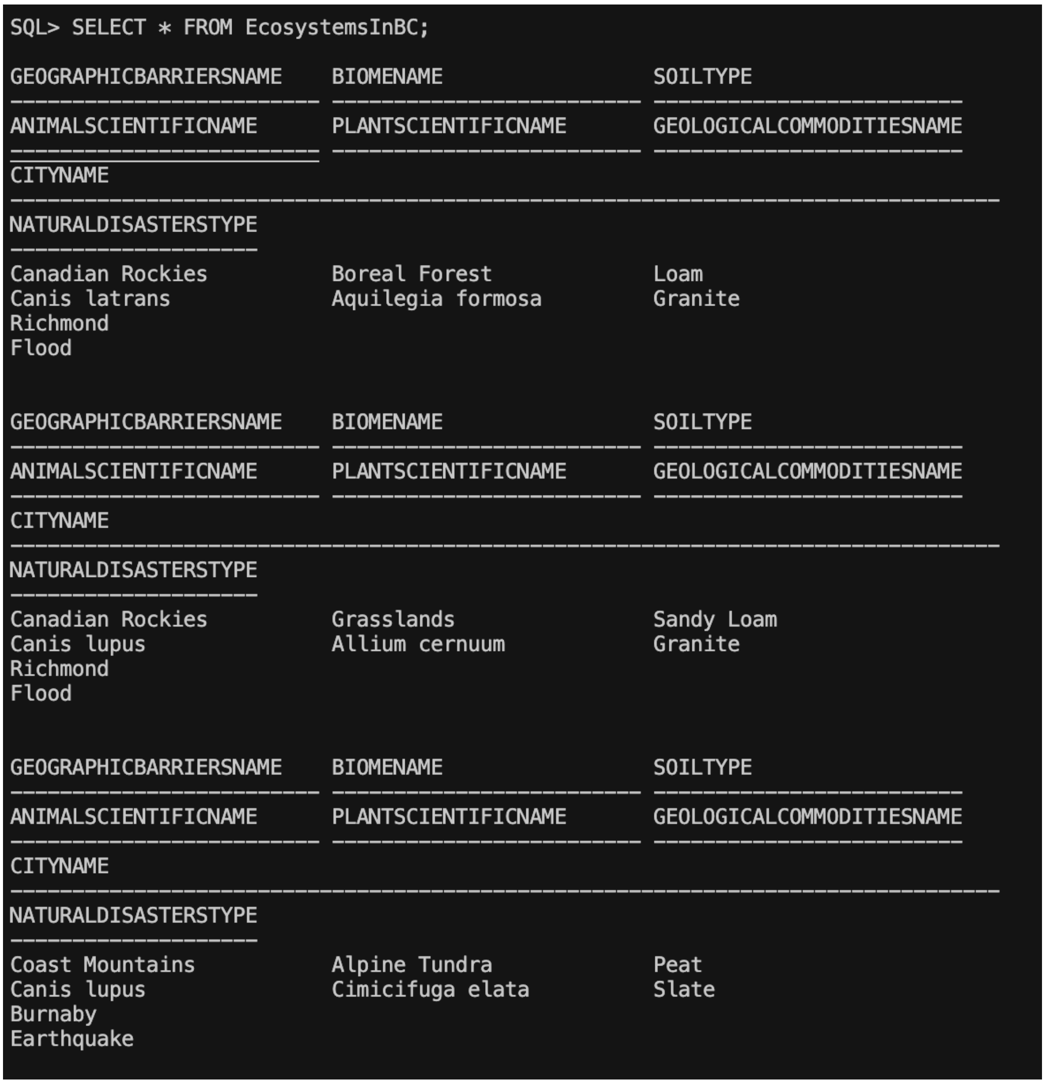


```
NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------
Kelowna
                     2023

Fire
Coquitlam
                     2022


NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------
Flood
Richmond
                     2021

Earthquake
Keremeos
                     2021

NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------

Flood
Coquitlam
                     2022

Tsunami
Vancouver
```

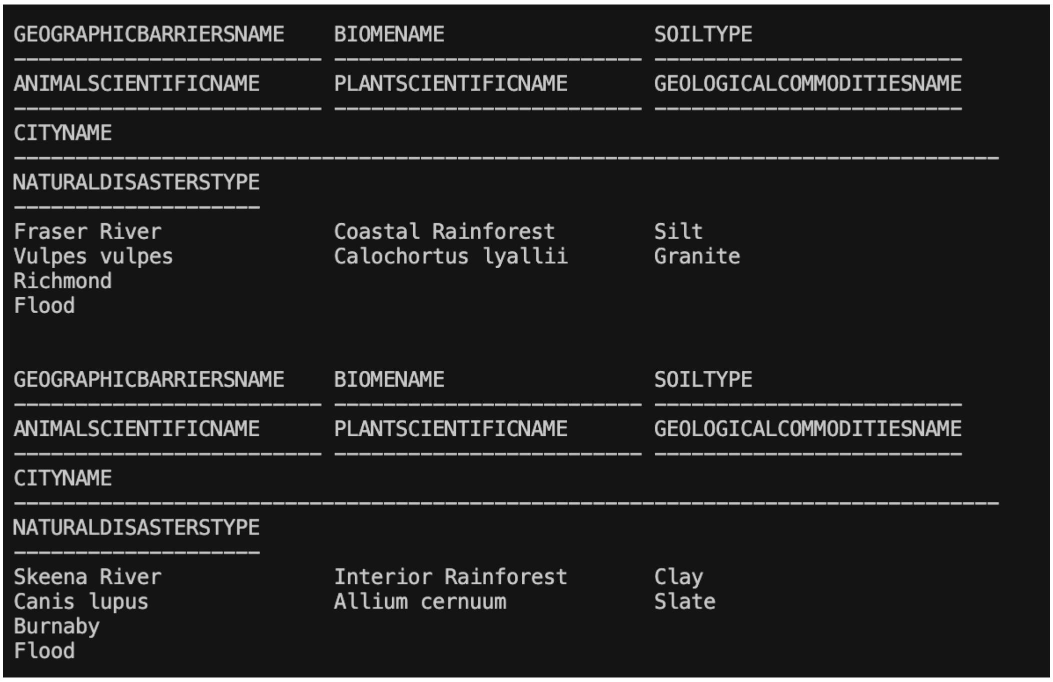


```
NATURALDISASTERTYPE
--------------------
CITYNAME
--------------------------------------------------------------------------------
YEAROFMOSTRECENTOCCURENCE
-------------------------
                     2021

Avalanche
Vancouver
                     2022
```

EcosystemsInBC:



```
SQL> SELECT * FROM EcosystemsInBC;

GEOGRAPHICBARRIERSNAME    BIOMENAME                 SOILTYPE
------------------------- ------------------------- -------------------------
ANIMALSCIENTIFICNAME      PLANTSCIENTIFICNAME       GEOLOGICALCOMMODITIESNAME
------------------------- ------------------------- -------------------------
CITYNAME
--------------------------------------------------------------------------------
NATURALDISASTERSTYPE
--------------------
Canadian Rockies          Boreal Forest             Loam
Canis latrans             Aquilegia formosa         Granite
Richmond
Flood


GEOGRAPHICBARRIERSNAME    BIOMENAME                 SOILTYPE
------------------------- ------------------------- -------------------------
ANIMALSCIENTIFICNAME      PLANTSCIENTIFICNAME       GEOLOGICALCOMMODITIESNAME
------------------------- ------------------------- -------------------------
CITYNAME
--------------------------------------------------------------------------------
NATURALDISASTERSTYPE
--------------------
Canadian Rockies          Grasslands                Sandy Loam
Canis lupus               Allium cernuum            Granite
Richmond
Flood


GEOGRAPHICBARRIERSNAME    BIOMENAME                 SOILTYPE
------------------------- ------------------------- -------------------------
ANIMALSCIENTIFICNAME      PLANTSCIENTIFICNAME       GEOLOGICALCOMMODITIESNAME
------------------------- ------------------------- -------------------------
CITYNAME
--------------------------------------------------------------------------------
NATURALDISASTERSTYPE
--------------------
Coast Mountains           Alpine Tundra             Peat
Canis lupus               Cimicifuga elata          Slate
Burnaby
Earthquake
```



```
GEOGRAPHICBARRIERSNAME    BIOMENAME                 SOILTYPE
------------------------- ------------------------- -------------------------
ANIMALSCIENTIFICNAME      PLANTSCIENTIFICNAME       GEOLOGICALCOMMODITIESNAME
------------------------- ------------------------- -------------------------
CITYNAME
--------------------------------------------------------------------------------
NATURALDISASTERSTYPE
--------------------
Fraser River              Coastal Rainforest        Silt
Vulpes vulpes             Calochortus lyallii       Granite
Richmond
Flood

GEOGRAPHICBARRIERSNAME    BIOMENAME                 SOILTYPE
------------------------- ------------------------- -------------------------
ANIMALSCIENTIFICNAME      PLANTSCIENTIFICNAME       GEOLOGICALCOMMODITIESNAME
------------------------- ------------------------- -------------------------
CITYNAME
--------------------------------------------------------------------------------
NATURALDISASTERSTYPE
--------------------
Skeena River              Interior Rainforest       Clay
Canis lupus               Allium cernuum            Slate
Burnaby
Flood
```