Problem-3 - Report

I read the document available at http://oceantrackingnetwork.org/about/#oceanmonitoring and wrote the report on what are the different datasets and attributes I discovered.

Ocean Tracking Network is a global platform that monitors aquatic species through international expertise, data warehousing and technological innovation. It provides sustainable management of aquatic animals by providing knowledge on their movements, habitats, and survival in the face of changing global environments.

1. **Datasets:**
2. Detection
3. Manmade Platform
4. Project
5. Receivers
6. Recover offload
7. Tag releases
8. Animal
9. Animal Scientific name
10. Datacentre
11. Transmitter

1. **Attributes:**

Datasets	Attributes
1. Detection	Detection_id, time(UTC), latitude(degrees_north), longitude(degrees_east), tracker_reference, detection_reference_id, detection_reference_type, transmitter_id, detection_serial_number, sensor_data, sensor_data_units, deployment_id, detection_quality, position_data_source, uncertainty_in_latitude, uncertainty_in_longitude, detection_project_reference, datacentre_reference, transmitter_id, transmitter_codespace, detection_transmittername,
2. Manmade Platform:	Platform_reference, platform_project_reference, platform_type, platform_depth, latitude(degree_north), longitude(degree_east), datacentre_reference

3. Project:	project_reference, project_name, project_abstract, project_citation, project_pi, project_pi_organization, project_pi_contact, project_infourl, project_keywords, project_keywords_vocabulary, project_license, project_datum, project_geospatial_lon_min(degrees_east), project_geospatial_lon_max(degrees_east), project_geospatial_lat_min(degrees_north), project_geospatial_lat_max(degrees_north), geospatial_vertical_min, geospatial_vertical_max, datacenter_reference
4. Receivers:	deployment_id, receiver_reference_type, receiver_manufacturer, latitude (degrees_north), longitude (degrees_east), time(UTC), recovery_datetime_utc (UTC), bottom_depth (m), depth (m), deployment_comments, receiver_model, receiver_reference_id, datacenter_reference
5. Recover offload:	recovery_id, recovery_latitude, recovery_longitude, recovery_datetime_utc, recovery_outcome, data_offloaded, offload_datetime_utc, log_filenames, recovery_comments, recovery_project_reference, datacenter_reference
6. Tag releases:	release_reference_id, release_reference_type, latitude (degrees_north), longitude (degrees_east), time (UTC), expected_enddate (UTC), manufacturer, tag_model, tag_serial_number, tag_coding_system, transmitted_id, transmittername, transmittername, tag_device_id, datacenter_reference
7. animals	Vernacularname, scientificname, aphiaid, tsn
8. datacentre	datacenter_reference, datacenter_name, datacenter_abstract, datacenter_citation, datacenter_pi, datacenter_pi_organization, datacenter_pi_contact, datacenter_keywords, datacenter_keywords_vocabulary, datacentre_doi, datacentre_licence, datacentre_distribution_statement, datacentre_date_modified,

	datacentre_geospatial_ion_min, datacentre_geospatial_ion_max, datacentre_geospatial_lat_min, datacentre_geospatial_lat_max.
9. Transmitter	

2. **Cleaning and Spreadsheet Filteration:**

Table-1: otnunit_aat_animals_8dc3_4d15_c278:

- Deleted Taxorank column because it was blank.
- Added "UNKNOWN" value at some places where the column was blank. We add "UNKNOWN" because we don't know its exact value and the value can be NULL too.

- In Stock column, there were already "UNKNOWN" values but there was also a blank. So I added "UNKNOWN" values in the blank column. We add "UNKNOWN" because we don't know its exact value and the value can be NULL too.

- In length_avg column, there were blanks, so instead of blank values I took the average of the entire column and added the average value in the blank places. The average value for length_avg column = 0.201.
  (We are taking the average values because consistency in the data is maintained).
- In weight_avg column, there were blanks, so instead of blank values I took the average of the entire column and added the average value in the blank places. The average value for weight_avg column = 0.345.
  (We are taking the average values because consistency in the data is maintained).
- In life_stage column, there were blanks. So I added "UNKNOWN" values in the blank column. We add "UNKNOWN" because we don't know its exact value and the value can be NULL too.
- In age column, there were "NaN" values, so instead of those values I took the average of the entire column i.e. average of age column and added the average value instead of "NaN". The average value for weight_avg column = 5.33.
  (We are taking the average values because consistency in the data is maintained).
- In sex column, there were blanks. So I added "UNKNOWN" values in the blank column. We add "UNKNOWN" because we don't know its exact value and the value can be NULL too.

Table-2: otnunit_aat_datacenter_attributes_8a94_cefd_f8a3:

- Removed first row because it was empty.
- Deleted column time_converge_start because it contained no data.
- Deleted column time_converge_end because it contained no data.
- In datacenter_geospatial_ion_min column, there were "NaN" values, so instead of those values I took the average of the entire column and added the average value instead of "NaN". The average value for datacenter_geospatial_ion_min = -89.803. (We are taking the average values because consistency in the data is maintained).
- In datacenter_geospatial_ion_max column, there were "NaN" values, so instead of those values I took the average of the entire column and added the average value instead of "NaN". The average value for datacenter_geospatial_ion_max= 43.076. (We are taking the average values because consistency in the data is maintained).
- In datacenter_geospatial_lat_min column, there were "NaN" values, so instead of those values I took the average of the entire column and added the average value instead of "NaN". The average value for datacenter_geospatial_lat_min= -26.872. I took the average of latitude because the location can be nearby the other values. (We are taking the average values because consistency in the data is maintained).
- In datacenter_geospatial_lat_max column, there were "NaN" values, so instead of those values I took the average of the entire column and added the average value instead of "NaN". The average value for datacenter_geospatial_lat_max= 37.005. . I took the average of latitude because the location can be nearby the other values. (We are taking the average values because consistency in the data is maintained).

Table-3: (otnunit_aat_detections_9062_5923_1394)

- Metadata mentioned in the column.
- In sensor column, took average of the value and replaced instead of the NULL values. The average value = 11.71
- In sensor_data_units, added "UNKNOWN" values instead of blank spaces.
- In detection_quality, added "UNKNOWN" values instead of blank spaces.
- In depth column, I added value depth "-1" instead of "NaN".(Took record of approx 30000 record)
- In Uncertainity_in_latitude, added "UNKNOWN" values instead of blank spaces.
- In Uncertainity_in_longitude, added "UNKNOWN" values instead of blank spaces.
- In depth_data_source_column, Uncertainity_in_depth, other_position_data, dataset_quality,the column was empty so deleted it.

Table-4: (otnunit_aat_manmade_platform_0735_7c9f_329c)

- Meta data is present for latitude and longitude so added along with column name
- Null values in latitude is replaced with 43.03

- Null values in longitude is replaced with -66.36

Table-5: otnunit_aat_project_attributes_f29c_fb21_23a3

- Metadata is written in brackets.
- Project_pi – Column had some blank values which I replaced it to "UNKNOWN" values because value can be anything.
- In project_citation column - had some blank values which I replaced it to "UNKNOWN" values because value can be anything.
- In Project_infourl column, I replaced null, blanks, NA with "UNKNOWN" values because value can be anything.
- Project_references, project_doi, project_distribution, project_date_modified, project_linestring was blank so I deleted the column to avoid data redundancy.
- In Geospatial_vertical_max, I wrote down the average value of the whole column instead of blank value. The average value = 95.479.
- In Geospatial_vertical_positive, time_coverage_start, time_coverage_end, the values was blank so I deleted the column.

Table-6: otnunit_aat_receivers_c595_05f4_68b2:

- For receiver manufacturer, I added "UNKNOWN" values in place of null values
- For frequencies_monitored and receiver_coding_scheme, entire column is empty so deleted the column.
- recovery_datetime_utc contains null values so I added max date Range i.e. 9999-12-31T23:59:59Z instead of those values.
- In receiver_reference_id, null value is replaced by UNKNOWN.
- In bottom_depth values, null value replaced with 123.8 which is the average value.
- In depth column, replace null values with 74.7 which is the average value.
- In deployment_columns, null values replaced by 9.65 which is the average value.
- In deployed column, removed as it contains null values throughout the column.
- In expected_receiver_life column, removed the entire column as it contains NaN.

Table-7: otnunit_aat_recover_offload_details_4b23_f002_f89a

- In log_files, the UNKNOWN values are replaced by Blanks.
- In recovery_comments, the UNKNOWN values are replaced by Blanks.
- In clock_Synchronized, the whole column was deleted because there were null values.
- In recovered_by, the whole column was deleted because there were null values.

Table-8: otnunit_aat_tag_releases_b793_03e7_a230

- In meta tags were there for latitude, longitude, time, expected_enddate so combined with column name.
- In remove tag_frequency column, as it contains null value in entire column

- In columns such as transmitter_type and tag_programming_id, I removed as it is of no use to avoid data redundancy.

3. **Normalization:**

In the clean spreadsheets/CSVs I created, there is a possibility of further decomposing of the files, or columns in the files (without losing information. So here are the steps for normalizing.

Animal table:
In the table, vernacular name, scientific name attribute were partially dependant on the aphiaid, so we created new animal scientific table.
In animal table,

aphiaid = Foreign Key, animal_reference_id= Primary Key, datacenter_reference = Foreign Key

aphiaid	animal_origin	stock	length	length_type	weight	life_stage	age	sex	animal_reference_id	animal_project_ref	datacenter_reference	
127188	W	UNK	0.561	FORK		2.35	UNKNOWN	5.33	U	FRO-T14	FRO	OTN-Global
127188	W	UNK	0.576	FORK		2.53	UNKNOWN	5.33	U	FRO-T2	FRO	OTN-Global
127188	W	UNK	0.57	FORK		2.41	UNKNOWN	5.33	U	FRO-T25	FRO	OTN-Global
127188	W	UNK	0.6	FORK		2.8	UNKNOWN	5.33	U	FRO-T26	FRO	OTN-Global
127188	W	UNK	0.55	FORK		2.17	UNKNOWN	5.33	U	FRO-T27	FRO	OTN-Global
127188	W	UNK	0.49	FORK		1.55	UNKNOWN	5.33	U	FRO-T28	FRO	OTN-Global
127188	W	UNK	0.45	FORK		1.24	UNKNOWN	5.33	U	FRO-T29	FRO	OTN-Global
127188	W	UNK	0.521	FORK		1.89	UNKNOWN	5.33	U	FRO-T5	FRO	OTN-Global
127188	W	UNK	0.556	FORK		2.29	UNKNOWN	5.33	U	FRO-T1	FRO	OTN-Global
127188	W	UNK	0.54	FORK		2.15	UNKNOWN	5.33	U	FRO-T41	FRO	OTN-Global
127188	W	UNK	0.588	FORK		2.69	UNKNOWN	5.33	U	FRO-T8	FRO	OTN-Global
127188	W	UNK	0.64	FORK		3.44	UNKNOWN	5.33	U	FRO-T7	FRO	OTN-Global
127188	W	UNK	0.54	FORK		2.1	UNKNOWN	5.33	U	FRO-T4	FRO	OTN-Global
127188	W	UNK	0.612	FORK		3.02	UNKNOWN	5.33	U	FRO-T6	FRO	OTN-Global
127188	W	UNK	0.6	FORK		2.85	UNKNOWN	5.33	U	FRO-T9	FRO	OTN-Global
127188	W	UNK	0.544	FORK		2.15	UNKNOWN	5.33	U	FRO-T10	FRO	OTN-Global
127188	W	UNK	0.586	FORK		2.66	UNKNOWN	5.33	U	FRO-T13	FRO	OTN-Global
127188	W	UNK	0.596	FORK		2.8	UNKNOWN	5.33	U	FRO-T11	FRO	OTN-Global
127188	W	UNK	0.54	FORK		2.1	UNKNOWN	5.33	U	FRO-T12	FRO	OTN-Global
127188	W	UNK	0.53	FORK		1.97	UNKNOWN	5.33	U	FRO-T33	FRO	OTN-Global

In animal_scientific_name table:

Aphiaid = Primary key

	A	B	C	D	E
	vernacularname	scientificname	aphiaid	tsn	
	Arctic char	Salvelinus alpinus	127188	162001	
	Atlantic salmon	Salmo salar	127186	161996	
	blue shark	Prionace glauca	105801	160424	
	leervis	Lichia amia	126810	168769	
	spotted grunter	Pomadasys commerso	218563	630243	
	white shark	Carcharodon carcharia	105838	159903	
	smooth hound shark	Mustelus mustelus	105822	160242	
	sevengill shark	Notorynchus cepedian	217628	159829	
0	Zambezi shark	Carcharhinus leucas	105792	160275	
1	tiger shark	Galeocerdo cuvier	105799	160189	
2	Chinook salmon	Oncorhynchus tshawyt	158075	161980	
3	Dungeness crab	Cancer magister	452271	98675	
4	English sole	Parophrys vetulus	254393	172921	
5	Steelhead salmon	Oncorhynchus mykiss	127185	161989	
6	sockeye, kokanee	Oncorhynchus nerka	254569	161979	
7	Coho salmon	Oncorhynchus kisutch	127184	161977	
8					
9					

In datacenter table:
Initially, when I got the dataset, I noticed that all the tables had the datacenter attribute. So every table of the dataset was pointing towards the table datacenter.

Datacenter_reference = Primary key

	D	E	F	G	H	
1	datacenter_citation	datacenter_pi	datacenter_pi_organization	datacenter_pi_contact	datacenter_infourl	d
2	Ocean Tracking Network Data Centre - Northeast Pacific Node	Director of Data Management	OTN	otndc@dal.ca	https://members.oceantrack.org	A
3	Ocean Tracking Network Data Centre.	Director of Data Management	OTN	otndc@dal.ca	https://members.oceantrack.org	A
4	Ocean Tracking Network Data Centre - South Africa Node	Director of Data Management	OTN	otndc@dal.ca	https://members.oceantrack.org	A
5	Ocean Tracking Network Data Centre - Northeast Pacific Node	Director of Data Management	OTN	otndc@dal.ca	https://members.oceantrack.org	A
6						
7						

	H	I	J	K	L
1	datacenter_infourl	datacenter_keywords	datacent	datacenter_doi	datacenter_license
2	https://members.oceantrack.org	ACADEMIC > DALHOUSIE/BIOLOGY, EARTH SCIENCE > BIOLOGICAL CL	GCMD	10.1428	By accessing or using OTN Data you agree to: Â¦
3	https://members.oceantrack.org	ACADEMIC > DALHOUSIE/BIOLOGY, EARTH SCIENCE > BIOLOGICAL CL	GCMD	10.1428	By accessing or using OTN Data you agree to: a) give p
4	https://members.oceantrack.org	ACADEMIC > DALHOUSIE/BIOLOGY, EARTH SCIENCE > BIOLOGICAL CL	GCMD	10.1428	By accessing or using OTN Data you agree to:Â¦
5	https://members.oceantrack.org	ACADEMIC > DALHOUSIE/BIOLOGY, EARTH SCIENCE > BIOLOGICAL CL	GCMD	10.1428	By accessing or using OTN Data you agree to: Â¦
6					
7					
8					
9					

datacenter_doi	datacenter_license	datacenter_distribution_statement	datacenter_date_modified	datacenter_geospatial_lo	datacente	datacente
10.1428	By accessing or using OTN Data you agree to: Â¦	a) give proper attribution to all Data Providers and to OTN by using the prefor		-89.8	43.07	-26.87
10.1428	By accessing or using OTN Data you agree to: a) give proper attribution to all Data Providers and to OTN by using the preformed citations con			-108.511	148.83	-50.9809
10.1428	By accessing or using OTN Data you agree to:Â¦	a) give proper attribution to all Data Providers and to OTN by using the prefor		16	36	-34.6304
10.1428	By accessing or using OTN Data you agree to: Â¦	a) give proper attribution to all Data Providers and to OTN by using the prefor		-176.9	-55.6	4.9932

	datacenter_distribution_statement	datacenter_date_modified	datacenter_geospatial_lon_mi	datacenter_geosp	datacenter_geospa	datacenter_geospatial_lat_max
	a) give proper attribution to all Data Providers and to OTN by using the prefor		-89.8	43.07	-26.87	37
roper attribution to all Data Providers and to OTN by using the preformed citations con			-108.511	148.83	-50.9809115	74.75011
	a) give proper attribution to all Data Providers and to OTN by using the prefor		16	36	-34.63038	-24.5
	a) give proper attribution to all Data Providers and to OTN by using the prefor		-176.9	-55.6	4.9932	60.7663

In detection table,

Detection_id = Primary key, Transmitter_id = Foreign Key, Datacentre_reference = Foreign Key

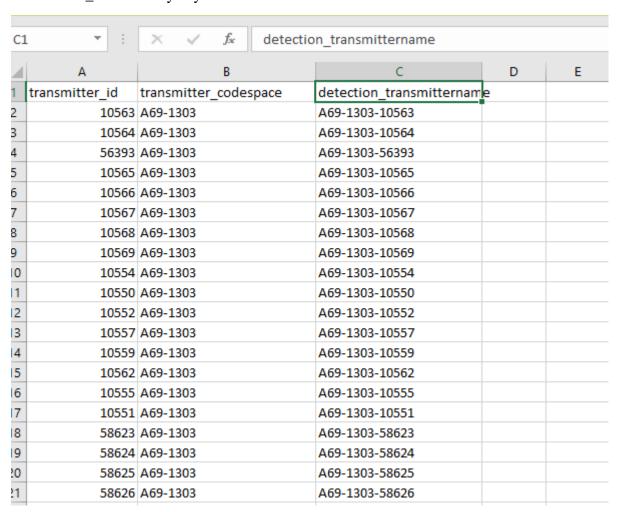| detection_id	time(UTC)	latitude(degrees	longitude(degrees_east	tracker_reference	detection_reference	detection_referen	transmitter_id	detection_serial	sensor_data	sensor_da	deployr
A69-1303-8	2008-05-20T10:14:1	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T07:39:3	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T07:38:4	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T14:38:4	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T04:42:2	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T04:41:3	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T08:51:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T08:53:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T08:52:1	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T17:58:2	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T03:07:4	44.92408	-62.5425	WRS	WRS-10563	ANIMAL	10563	1085	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T04:06:3	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T05:16:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T06:17:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T08:51:3	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T10:30:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T14:36:2	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T05:50:3	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-20T12:00:5	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S
A69-1303-8	2008-05-19T04:06:0	44.91786	-62.53628	WRS	WRS-10563	ANIMAL	10563	1136	11.71	UNKNOW	WRSH-S

	detection_referen	transmitter_id	detection_serial	sensor_data	sensor_data	deployment_id	detection_qua	position_data_source	uncertainty_in_l	uncertainty_	detection	datacenter_reference
1	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
2	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
3	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
4	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
5	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
6	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
7	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
8	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
9	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
10	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
11	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
12	ANIMAL	10563	1085	11.71	UNKNOWN	WRSH-SW1-VR2-1085-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
13	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
14	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
15	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
16	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
17	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
18	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
19	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
20	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global
21	ANIMAL	10563	1136	11.71	UNKNOWN	WRSH-SW2-VR2-1136-1	UNKNOWN	Receiver Metadata	UNKNOWN	UNKNOWN	WRS	OTN-Global

<u>In transmitter table,</u>

Initially, in the unnormalized table, the transmitter_id, transmitter_codespace, detection_transmittername were have a single responsibility so they were separated and created a new table called transmitter table.

Transmitter_id = Primary key

C1	▾ ⋮	✕ ✓ f_x	detection_transmittername		
	A	B	C	D	E
1	transmitter_id	transmitter_codespace	detection_transmittername		
2	10563	A69-1303	A69-1303-10563		
3	10564	A69-1303	A69-1303-10564		
4	56393	A69-1303	A69-1303-56393		
5	10565	A69-1303	A69-1303-10565		
6	10566	A69-1303	A69-1303-10566		
7	10567	A69-1303	A69-1303-10567		
8	10568	A69-1303	A69-1303-10568		
9	10569	A69-1303	A69-1303-10569		
10	10554	A69-1303	A69-1303-10554		
11	10550	A69-1303	A69-1303-10550		
12	10552	A69-1303	A69-1303-10552		
13	10557	A69-1303	A69-1303-10557		
14	10559	A69-1303	A69-1303-10559		
15	10562	A69-1303	A69-1303-10562		
16	10555	A69-1303	A69-1303-10555		
17	10551	A69-1303	A69-1303-10551		
18	58623	A69-1303	A69-1303-58623		
19	58624	A69-1303	A69-1303-58624		
20	58625	A69-1303	A69-1303-58625		
21	58626	A69-1303	A69-1303-58626		

<u>In manmade table,</u>

I just rearranged the datacentre_reference

Datacentre_reference = Foreign Key, platform_reference_id = Primary Key

platform_reference_i	platform_project_ref	platform_type	platform_depth	latitude(degree_nort	longitude(degree_ea	datacenter_referenc
SAF-MB002	SAF	Underwater mooring	21	-34.08662	22.19435	OTN-Global
SAF-MB013	SAF	Underwater mooring	48	-34.15786	22.24009	OTN-Global
SAF-FB001	SAF	Underwater mooring	41	-34.36798	18.81178	OTN-Global
SAF-MB014	SAF	Underwater mooring	50	-34.16428	22.24424	OTN-Global
SAF-AB001	SAF	Underwater mooring	20	-33.77729	26.31278	OTN-Global
SAF-AB002	SAF	Underwater mooring	20	-33.78536	26.31389	OTN-Global
SAF-AB003	SAF	Underwater mooring	28	-33.79325	26.3152	OTN-Global
SAF-AB004	SAF	Underwater mooring	28	-33.8017	26.31621	OTN-Global
SAF-AB005	SAF	Underwater mooring	30	-33.80968	26.31628	OTN-Global
SAF-AB006	SAF	Underwater mooring	31	-33.81786	26.31632	OTN-Global
SAF-AB007	SAF	Underwater mooring	29	-33.82578	26.31655	OTN-Global
SAF-MB001	SAF	Underwater mooring	15	-34.08061	22.1905	OTN-Global
SAF-HB005	SAF	Underwater mooring	82	-34.04391	18.27266	OTN-Global
SAF-MB003	SAF	Underwater mooring	27	-34.09309	22.1985	OTN-Global
SAF-MB004	SAF	Underwater mooring	31	-34.0996	22.20267	OTN-Global
SAF-MB005	SAF	Underwater mooring	35	-34.10602	22.20682	OTN-Global
KM001	SAF	Underwater mooring	30.8	-32.704722	28.384833	OTN-Global

In Project Table,

Datacenter_reference = Foreign key, Project_reference_id = Primary key

	C1	▾ : × ✓ fx	project_abstract	
	A	B		C
1	project_reference	project_name	project_abstract	
2	SAIAB	SAIAB fish tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
3	DEASBT	Aliwal Shoal shark tracking	Aliwal Shoal shark tracking	
4	CBT	Movements of Brown Trout	Originating from Europe, Brown Trout, Salmo trutta, were introduced to New Brunswick's waters in 1921, in the Loch Lomond watershed. Brown Trout were sto	
5	V2LMOZ	Mitigating the risk of shark a	Twelve fatal bull shark (Carcharhinus leucas) attacks have occurred in the Inhambane estuary in the last two years. In response, a shark cull was implemented in 20	
6	DICTWS	Gansbaai white shark trackin	The unique environmental characteristics of Gansbaai make it the ideal site to test hypotheses regarding the influence of physical oceanography, prey species dist	
7	GEFT	Goukou Estuary fish tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
8	TZWS	Thresher, zambezi, and whit	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
9	TOA	Raggedtooth shark (Carchari	Two Oceans Aquarium has tagged over 30 raggedtooth sharks (Carcharias taurus) and are their movement behaviour is currently being tracked by ATAP receivers a	
10	ORI	ORI	Initial hypotheses suggest that because catches of giant guitarfish (Rhynchobatus djiddensis) are very seasonal (mainly caught in summer) and display nomadic mc	
11	SASC	SASC	Due to its low biological productivity (reproductive periodicity of three years) and longevity (>60 years), combined with inadequate fishery management measure	
12	MRMR	Mozambique reef manta ray	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
13	SPI	Shippagan, NB: Cod tagging	The objectives of this project are first to study the seasonal migration of the Atlantic cod (Gadus morhua) in the southern Gulf of St. Lawrence and secondly to exar	
14	KZNSB	KZNSB fish tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
15	SSST	Shark Spotters shark tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
16	BOONSW	Buoys of Opportunity - NOAA	Increasingly, passive acoustic monitoring systems (PAMs) including moored buoys are being deployed to document the presence of whales and other species that	
17	ABRS	Algoa Bay raggedtooth shark	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
18	BRFT	Breede River fish tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
19	DCDK	Dwesa Cwebe dusky kob trac	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	
20	BOOABS	Buoys of Opportunity - Arctic	Canada's Department of Fisheries and Oceans deploys moorings with scientific monitoring equipment for biological and oceanographic reasons strategically in	
21	IWP	IWP fish tracking	South Africa's Institute for Aquatic Biodiversity (SAIAB), located on the campus of Rhodes University in Grahamstown, South Africa, maintains the Acoustic Tracking	

	D	E	F	G	H	I	J	
	project_citation	project_pi	project_pi_organization	project_pi_contact	project_infourl	project_keywords	project_k	proje
2	Cowley, P., Childs, A., Murra	Paul Cowley	SAIAB	tagfish@gmail.com	http://www.saiab.ac.za/	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
3	Singh S., Anders D. yyyy. Bla	Darrel Anders	DEA	danders@environment.gov.za	https://www.environment.gov.za/	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
4	Curry, A., Gautreau, M. 2016.	Allen Curry	UNB-F	racurry@unb.ca	http://members.oceantrack.org/data	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
5	Murie, C., Dicken, M., Oliver,	Calum Murie	MMF	calummurie@gmail.com	http://members.oceantrack.org/data	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
6	Towner A., Smale M. 2015. G	Alison Towner	DICT	alisontowner@gmail.com	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
7	Lamberth, S., Du Plessis, J., C	Steve Lamberth	DAFF	stephenl@daff.gov.za	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
8	Dicken, M. yyyy. Thresher, za	Matt Dicken	NMMU	raggedtoothshark@bayâ€‹world.co.z	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
9	Beukes, T. 2010. Raggedtooth	Tinus Beukes	TOA	tinus.beukes@aquarium.co.za	https://www.aquarium.co.za/	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
10	Mann, B., Cowley, P. 2016. Tr	Bruce Mann	ORI	bruce@ori.org.za	http://www.seaworld.org.za/ori	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
11	McCord, M. 2017. Movement	Meaghan McCord	SASC	meag@sharkconservancy.org	http://www.sharkconservancy.org/	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
12	Marshall, A. yyyy. Mozambiq	UNKNOWN	MMF	UNKNOWN	http://members.oceantrack.org/data	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
13	Swain, D., Comeau, L., Bowe	Doug Swain	DFO-GFC	doug.swain@dfo-mpo.gc.ca	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
14	Cliff, G. yyyy. KwaZulu-Natal	Geremy Cliff	KZNSB	cliff@shark.co.za	http://www.shark.co.za/	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
15	Kock, A., Barnett, A. yyyy. Sh	Alison Kock	Shark Spotters	alison.kock@gmail.com	http://sharkspotters.org.za/	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
16	Whoriskey, F. 2016. Buoys of	Fred Whoriskey	NOAA-NMFS-NEFSC	fwhoriskey@dal.ca	https://www.nefsc.noaa.gov/salmon	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
17	Smale, M. yyyy. Alboa Bay ra	Malcolm Smale	Bayworld	msmale@bayworld.co.zâ€‹a	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
18	McCord, M., Lamberth, S. Ke	Meaghan McCord	SASC	meag@sharkconservancy.org	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
19	Venter, J. yyyy. Dwesa Cweb	Jan Venter	ECPT	jannie.ven@gmail.com	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac
20	Bartholette, J., Richards, C., \	Fred Whoriskey	DFO-BIO	fwhoriskey@dal.ca	http://members.oceantrack.org/data	; EARTH SCIENCE > BIOLOGICAL C	GCMD	By ac
21	Floros, C. yyyy. iSimangaliso	Camilla Floros	ORI	cfloros@ori.org.za	http://members.oceantrack.org/data	ACOUSTIC TRANSMITTERS; ; EAR	GCMD	By ac

	I	J	K	L	M	N	O	P
	project_keywords	project_keywords_	project_license	project_datum	project_geospatial_lon_min(degrees	project_geospatial_lon_max(degrees_e	project_g	project_g
2	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	18.453813	32.94051	-26.7436	-34.4094
3	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	30.82757	30.82757	-30.244	-30.244
4	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	-67	-65.5	47.4016	45
5	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	34.5	36	-23.5	-24.5
6	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	19.37508	19.37508	-34.6304	-34.6304
7	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	21.429	21.429	-34.381	-34.381
8	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	25.801	32.9	-26.84	-33.8343
9	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	16	34	-26	-35
10	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	30.849909	31.169909	-29.7018	-30.0218
11	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	19.1961111	19.2761111	-34.3775	-34.4575
12	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	35.364267	35.364267	-23.8562	-23.8562
13	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	-64.83	-63.55	48.36	47.54
14	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	26.280245	29.57	-31.62	-33.8343
15	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	18.518072	18.518072	-34.3496	-34.3496
16	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	-70.6876673	-69.9285511	42.08232	41.51499
17	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	18.632165	25.83	-33.7874	-34.785
18	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	20.97	20.97	-34.45	-34.45
19	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	28.895	28.91	-32.25	-32.26
20	; EARTH SCIENCE > BIOLOGICAL CLASSIFICATION > AN	GCMD	By accessing or using OTN	WGS84	-97.8160075	-97.7839927	74.38634	74.3803
21	ACOUSTIC TRANSMITTERS; ; EARTH SCIENCE > BIOLOG	GCMD	By accessing or using OTN	WGS84	31.015365	32.8653	-27.0469	-29.9337

N	O	P	Q	R	S	T	U
project_geospatial_lon_max(degrees_e	project_geospatial_lat_min(degrees_	project_geospatial_lat_max(degrees_nor	geospatial_vertical_m	geospatial_vertical_max	datacenter_reference		
32.94051	-26.7436	-34.40943	0	95.479	OTN-Global		
30.82757	-30.24398	-30.24398	0	95.479	SAF		
-65.5	47.4015978	45	0	95.479	OTN-Global		
36	-23.5	-24.5	0	95.479	SAF		
19.37508	-34.63038	-34.63038	0	95.479	SAF		
21.429	-34.381	-34.381	0	95.479	OTN-Global		
32.9	-26.84	-33.83425	0	95.479	OTN-Global		
34	-26	-35	0	95.479	SAF		
31.169909	-29.701825	-30.021825	0	95.479	SAF		
19.2761111	-34.3775	-34.4575	0	95.479	SAF		
35.364267	-23.856172	-23.856172	0	95.479	OTN-Global		
-63.55	48.36	47.54	0	95.479	OTN-Global		
29.57	-31.62	-33.834252	0	95.479	OTN-Global		
18.518072	-34.349615	-34.349615	0	95.479	OTN-Global		
-69.9285511	42.0823174	41.5149887	0	95.479	OTN-Global		
25.83	-33.78743	-34.78497	0	95.479	OTN-Global		
20.97	-34.45	-34.45	0	95.479	OTN-Global		
28.91	-32.25	-32.26	0	95.479	OTN-Global		
-97.7839927	74.3863364	74.380329	0	95.479	OTN-Global		
32.8653	-27.0469	-29.933734	0	95.479	OTN-Global		

<u>In receiver Table,</u>

Deployment_id = Primary key, datacenter_reference = Foreign Key

	A	B	C	D	E	F	G	H	I	J	
1	deployment_id	receiver_reference_t	receiver_serial_number	receiver_manufact	latitude (degrees_	longitude (degrees_e	time(UTC)	recovery_datetime_u	bottom_depth (m	depth (m)	dep
2	ASF-West Line D-VR	ManmadePlatform	2272	VEMCO	50.28333	-64.43556	2009-06-13T18:06	2009-08-06T20:00:00Z	20.9	7	UNK
3	ASF-WYERS POOL-K	ManmadePlatform	2603	VEMCO	47.81337	-67.73847	2006-05-23T03:00	2006-10-05T03:00:00Z	123.8	74.7	UNK
4	ASF-WYERS POOL-K	ManmadePlatform	3342	VEMCO	47.81336	-67.73846	2005-05-27T03:00	2005-10-01T03:00:00Z	123.8	74.7	UNK
5	ASF-2 km Upriver of	ManmadePlatform	1135	VEMCO	46.95367	-65.8715	2007-05-17T03:00	2007-06-26T03:00:00Z	1.538	74.7	UNK
6	ASF-Above Falls-VR	ManmadePlatform	3335	VEMCO	50.53819	-64.08922	2008-06-17T21:46	2008-08-06T17:50:00Z	1.2	1.2	UNK
7	ASF-Above Falls-VR	ManmadePlatform	3335	VEMCO	50.53819	-64.08922	2009-06-26T18:40	2009-08-07T17:50:00Z	1.2	1.2	UNK
8	ASF-Above Falls-VR	ManmadePlatform	3342	VEMCO	50.53819	-64.08922	2010-06-19T12:30	2010-08-13T18:48:00Z	1.2	74.7	UNK
9	ASF-Above Falls-VR	ManmadePlatform	3349	VEMCO	50.53819	-64.08922	2009-08-07T14:11	2010-06-19T16:30:00Z	0.6	0.6	UNK
10	ASF-Above Falls-VR	ManmadePlatform	3357	VEMCO	50.53819	-64.08922	2007-06-18T03:00	2007-07-30T17:00:00Z	1.5	1.5	UNK
11	ASF-Above Falls-VR	ManmadePlatform	5032	VEMCO	50.53819	-64.08922	2010-08-13T15:15	2011-08-14T03:00:00Z	123.8	74.7	UNK
12	ASF-Anticosti Island	ManmadePlatform	2587	VEMCO	49.89227	-64.5363	2010-05-31T21:00	2010-08-04T19:47:00Z	30	7	UNK
13	ASF-Anticosti Island	ManmadePlatform	2581	VEMCO	49.89673	-64.54998	2010-05-31T21:00	2010-08-31T03:34:00Z	60	7	UNK
14	ASF-Anticosti Island	ManmadePlatform	3335	VEMCO	49.90093	-64.5633	2010-05-31T21:00	2010-08-13T18:48:00Z	70	7	UNK
15	ASF-Anticosti Island	ManmadePlatform	3346	VEMCO	49.90455	-64.57548	2010-05-31T21:00	2010-08-04T20:14:00Z	80	7	UNK
16	EST-Gamtoos-VR2W	ManmadePlatform	119101	UNKNOWN	-33.96096	25.01524	2014-07-04T11:51	2015-02-25T14:25:00Z	1.6	1.6	UNK
17	EST-Gouritz-U22-00	ManmadePlatform	10098862	UNKNOWN	-34.33985	21.881	2013-10-23T11:00	2015-02-20T14:32:00Z	1	1	UNK
18	EST-Gouritz-VR2W-	ManmadePlatform	102853	UNKNOWN	-34.33985	21.881	2013-10-23T11:00	2015-02-20T14:32:00Z	1	1	UNK
19	EST-Keiskamma-U2	ManmadePlatform	10098859	UNKNOWN	-33.27771	27.48596	2014-02-17T12:50	2015-03-12T13:00:00Z	1.5	1.6	UNK
20	EST-Keiskamma-VR	ManmadePlatform	120163	UNKNOWN	-33.27771	27.48596	2014-02-17T12:50	2015-03-12T13:00:00Z	1.5	1.5	UNK
21	EST-Swartkops-VR2	ManmadePlatform	119095	UNKNOWN	-33.85946	25.6262	2014-06-24T13:22	2015-06-23T14:30:00Z	1.5	1.5	UNK
22	ESTSundays-VR2W-	ManmadePlatform	112441	UNKNOWN	-33.69511	25.83502	2014-11-28T16:52	2015-01-23T16:26:02Z	1.5	1.5	UNK
23	GSBGSB001-VR2W-1	ManmadePlatform	119624	UNKNOWN	-34.69701	19.40543	2014-12-08T13:47	2015-06-11T15:15:00Z	22.2	2.7	UNK

In recover table,

Recovery_id = Primary key, datacenter_reference = Foreign Key

	A	B	C	D	E	F	G	H	I	J	K	L	
	recovery_id	recovery_latitud	recovery_longitude	recovery_datetime_utc		recovery_	offload_datetime_utc	log_filenames	recovery_comn	recovery_project	datacenter_reference		
	ABO-Nar05-0	67.2495	-60.38247	2017-09-22T23:18:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Nar04-0	67.474117	-58.220567	2017-09-21T20:11:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Baff01-(	71.97833	-71.44208	2017-10-01T15:46:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff01-(	72.00928	-71.34455	2017-10-01T15:09:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff01-(	72.04222	-71.24047	2017-10-01T14:27:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff03-(	70.68323	-66.8139	2017-09-29T23:15:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff03-(	70.68698	-66.76618	2017-09-29T23:42:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff03-(	70.6934	-66.68692	2017-09-30T00:15:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff04-(	68.9778	-64.08512	2017-10-07T20:20:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff04-(	68.97877	-64.18338	2017-10-07T21:11:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Baff06-(	67.68628	-62.37112	2017-09-25T18:43:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Baff06-(	67.7546	-62.30852	2017-09-25T18:47:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Baff07-(	66.83978	-59.43223	2017-09-24T21:31:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Baff07-(	66.71638	-59.69172	2017-09-24T19:18:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Baff07-(	66.59733	-59.96162	2017-09-24T17:10:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Nar01-0	68.1608	-59.7771	2017-09-20T21:01:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Nar01-0	68.1608	-59.7771	2017-09-20T21:01:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Nar01-0	68.16305	-59.74157	2017-09-20T21:34:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Nar01-0	68.16463	-59.71915	2017-09-20T22:04:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Nar01-0	68.16967	-59.62118	2017-09-20T22:43:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		
	ABO-Nar01-0	68.16967	-59.62118	2017-09-20T22:43:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	Deployment/R	ABO	OTN-Global		
	ABO-Nar02-0	67.84975	-59.36618	2017-09-21T01:02:00Z	RECOVERD	N	9999-12-31T23:59:59Z	UNKNOWN	UNKNOWN	ABO	OTN-Global		

In tag_release table,

Tag_release_reference = primary key, datacenter_reference = Foreign key

	A	B	C	D	E	F	G	H	I	J	K	L	M
	release_reference_	release_reference	latitude (degrees_n	longitude (degree	time (UTC)	expected_end	manufacturer	tag_mode	tag_serial	tag_coding_system	transmitted_id	transmitte	release_
	GR-ST02	STATION	44.43351	-64.20316	2010-04-21T18:20:43Z	2010-06-22T18:	VEMCO	V9-2X	1091885	A69-1303	48123	A69-1303-	WRS
	SMR-ST01	STATION	45.12417	-61.97775	2010-05-04T01:51:40Z	2010-06-23T22:	VEMCO	V9-2X	1092157	A69-1303	48056	A69-1303-	WRS
	SMR-ST02	STATION	45.10567	-61.96656	2010-05-04T02:15:55Z	2010-06-23T21:	VEMCO	V9-2X	1092158	A69-1303	48057	A69-1303-	WRS
	LR-ST01	STATION	44.36644	-64.48	2010-04-24T21:59:08Z	2010-06-15T22:	VEMCO	V9-2X	1092159	A69-1303	48058	A69-1303-	WRS
	LR-ST02	STATION	44.24113	-64.30659	2010-04-23T18:29:18Z	2010-06-19T17:	VEMCO	V9-2X	1092160	A69-1303	48059	A69-1303-	WRS
	WRSH-ST01	STATION	44.90864	-62.51151	2010-04-16T17:52:41Z	2010-06-17T20:	VEMCO	V9-2X	1092554	A69-1303	48012	A69-1303-	WRS
	WRSH-ST02	STATION	44.86397	-62.48551	2010-04-29T22:53:38Z	2010-06-17T17:	VEMCO	V9-2X	1092555	A69-1303	48013	A69-1303-	WRS
	WRS-10569	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050442	A69-1303	10569	A69-1303-	WRS
	WRS-10568	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050441	A69-1303	10568	A69-1303-	WRS
	WRS-10567	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050440	A69-1303	10567	A69-1303-	WRS
	WRS-10566	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050439	A69-1303	10566	A69-1303-	WRS
	WRS-10565	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050438	A69-1303	10565	A69-1303-	WRS
	WRS-10564	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050437	A69-1303	10564	A69-1303-	WRS
	WRS-10563	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050436	A69-1303	10563	A69-1303-	WRS
	WRS-10562	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050435	A69-1303	10562	A69-1303-	WRS
	WRS-10561	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050434	A69-1303	10561	A69-1303-	WRS
	WRS-10560	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050433	A69-1303	10560	A69-1303-	WRS
	WRS-10559	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050432	A69-1303	10559	A69-1303-	WRS
	WRS-10558	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050431	A69-1303	10558	A69-1303-	WRS
	WRS-10557	ANIMAL	44.95838	-62.61541	2008-05-17T06:40:00Z	2008-10-21T06:	VEMCO	V9-1L	1050430	A69-1303	10557	A69-1303-	WRS

tag_mode	tag_serial	tag_coding_system	transmitted_id	transmittername	release_project_reference	tag_device_id	datacenter_reference
V9-2X	1091885	A69-1303	48123	A69-1303-48123	WRS	V9-2X-1091885-A69-13	OTN-Global
V9-2X	1092157	A69-1303	48056	A69-1303-48056	WRS	V9-2X-1092157-A69-13	OTN-Global
V9-2X	1092158	A69-1303	48057	A69-1303-48057	WRS	V9-2X-1092158-A69-13	OTN-Global
V9-2X	1092159	A69-1303	48058	A69-1303-48058	WRS	V9-2X-1092159-A69-13	OTN-Global
V9-2X	1092160	A69-1303	48059	A69-1303-48059	WRS	V9-2X-1092160-A69-13	OTN-Global
V9-2X	1092554	A69-1303	48012	A69-1303-48012	WRS	V9-2X-1092554-A69-13	OTN-Global
V9-2X	1092555	A69-1303	48013	A69-1303-48013	WRS	V9-2X-1092555-A69-13	OTN-Global
V9-1L	1050442	A69-1303	10569	A69-1303-10569	WRS	10569	OTN-Global
V9-1L	1050441	A69-1303	10568	A69-1303-10568	WRS	10568	OTN-Global
V9-1L	1050440	A69-1303	10567	A69-1303-10567	WRS	10567	OTN-Global
V9-1L	1050439	A69-1303	10566	A69-1303-10566	WRS	10566	OTN-Global
V9-1L	1050438	A69-1303	10565	A69-1303-10565	WRS	10565	OTN-Global
V9-1L	1050437	A69-1303	10564	A69-1303-10564	WRS	10564	OTN-Global
V9-1L	1050436	A69-1303	10563	A69-1303-10563	WRS	10563	OTN-Global
V9-1L	1050435	A69-1303	10562	A69-1303-10562	WRS	10562	OTN-Global
V9-1L	1050434	A69-1303	10561	A69-1303-10561	WRS	10561	OTN-Global
V9-1L	1050433	A69-1303	10560	A69-1303-10560	WRS	10560	OTN-Global
V9-1L	1050432	A69-1303	10559	A69-1303-10559	WRS	10559	OTN-Global
V9-1L	1050431	A69-1303	10558	A69-1303-10558	WRS	10558	OTN-Global
V9-1L	1050430	A69-1303	10557	A69-1303-10557	WRS	10557	OTN-Global

Therefore, the table is in normalized form.

4. **I Populate the database with the transformed dataset in mySQL workbench.**

5. **I allotted the foreign key and primary key for each table as mentioned above.**

6. **After that, I reversed engineer to get the possible ERD with added cardinalities which is as follows:**

animals_scientific_name
- ◇ï»¿vernacularname TEXT
- ◇ scientificname TEXT
- 🔑 aphiaid INT
- ◇ tsn INT

Indexes ▶

animals
- ◇ï»¿aphiaid INT
- ◇ animal_origin TEXT
- ◇ stock TEXT
- ◇ length DOUBLE
- ◇ length_type TEXT
- ◇ weight DOUBLE
- ◇ life_stage TEXT
- ◇ age DOUBLE
- ◇ sex TEXT
- 🔑 animal_reference_id VARCHAR(255)
- ◇ animal_project_reference TEXT
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

transmitter
- 🔑 ï»¿transmitter_id INT
- ◇ transmitter_codespace TEXT
- ◇ detection_transmittername TEXT

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tag_release
- ◇ï»¿release_reference_id VARCHAR(255)
- ◇ release_reference_type TEXT
- ◇ latitude (degrees_north) DOUBLE
- ◇ longitude (degrees_east) DOUBLE
- ◇ time (UTC) TEXT
- ◇ expected_enddate (UTC) TEXT
- ◇ manufacturer TEXT
- ◇ tag_model TEXT
- ◇ tag_serial_number INT
- ◇ tag_coding_system TEXT
- ◇ transmitted_id INT
- ◇ transmittername TEXT
- ◇ release_project_reference TEXT
- 🔑 tag_device_id VARCHAR(255)
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

detection
- 🔑 ï»¿detection_id VARCHAR(255)
- ◇ time(UTC) TEXT
- ◇ latitude(degrees_north) DOUBLE
- ◇ longitude(degrees_east) DOUBLE
- ◇ tracker_reference TEXT
- ◇ detection_reference_id TEXT
- ◇ detection_reference_type TEXT
- ◇ transmitter_id INT
- ◇ detection_serial_number INT
- ◇ sensor_data DOUBLE
- ◇ sensor_data_units TEXT
- ◇ deployment_id TEXT
- ◇ detection_quality TEXT
- ◇ position_data_source TEXT
- ◇ uncertainty_in_latitude TEXT
- ◇ uncertainty_in_longitude TEXT
- ◇ detection_project_reference TEXT
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

datacenter
- 🔑 datacenter_reference VARCHAR(255)
- ◇ datacenter_name TEXT
- ◇ datacenter_abstract TEXT
- ◇ datacenter_citation TEXT
- ◇ datacenter_pi TEXT
- ◇ datacenter_pi_organization TEXT
- ◇ datacenter_pi_contact TEXT
- ◇ datacenter_infourl TEXT
- ◇ datacenter_keywords TEXT
- ◇ datacenter_keywords_vocabulary TEXT
- ◇ datacenter_doi DOUBLE
- ◇ datacenter_license TEXT
- ◇ datacenter_distribution_statement TEXT
- ◇ datacenter_date_modified TEXT
- ◇ datacenter_geospatial_lon_min DOUBLE
- ◇ datacenter_geospatial_lon_max DOUBLE
- ◇ datacenter_geospatial_lat_min DOUBLE
- ◇ datacenter_geospatial_lat_max DOUBLE

Indexes ▶

project
- 🔑 project_reference VARCHAR(255)
- ◇ project_name TEXT
- ◇ project_abstract TEXT
- ◇ project_citation TEXT
- ◇ project_pi TEXT
- ◇ project_pi_organization TEXT
- ◇ project_pi_contact TEXT
- ◇ project_infourl TEXT
- ◇ project_keywords TEXT
- ◇ project_keywords_vocabulary TEXT
- ◇ project_license TEXT
- ◇ project_datum TEXT
- ◇ project_geospatial_lon_min(degrees_east) DOUBLE
- ◇ project_geospatial_lon_max(degrees_east) DOUBLE
- ◇ project_geospatial_lat_min(degrees_north) DOUBLE
- ◇ project_geospatial_lat_max(degrees_north) DOUBLE
- ◇ geospatial_vertical_min INT
- ◇ geospatial_vertical_max DOUBLE
- ◇ datacenter_reference VARCHAR(255)

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manmade_platform
- 🔑 platform_reference_id VARCHAR(255)
- ◇ platform_project_reference TEXT
- ◇ platform_type TEXT
- ◇ platform_depth INT
- ◇ latitude(degree_north) DOUBLE
- ◇ longitude(degree_east) DOUBLE
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

recover
- 🔑 ï»¿recovery_id VARCHAR(255)
- ◇ recovery_latitude DOUBLE
- ◇ recovery_longitude DOUBLE
- ◇ recovery_datetime_utc TEXT
- ◇ recovery_outcome TEXT
- ◇ data_offloaded TEXT
- ◇ offload_datetime_utc TEXT
- ◇ log_filenames TEXT
- ◇ recovery_comments TEXT
- ◇ recovery_project_reference TEXT
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

receiver
- 🔑 ï»¿deployment_id VARCHAR(255)
- ◇ receiver_reference_type TEXT
- ◇ receiver_serial_number INT
- ◇ receiver_manufacturer TEXT
- ◇ latitude (degrees_north) DOUBLE
- ◇ longitude (degrees_east) DOUBLE
- ◇ time(UTC) TEXT
- ◇ recovery_datetime_utc (UTC) TEXT
- ◇ bottom_depth (m) DOUBLE
- ◇ depth (m) DOUBLE
- ◇ deployment_comments TEXT
- ◇ deployment_project_reference TEXT
- ◇ receiver_model TEXT
- ◇ receiver_reference_id TEXT
- ◇ datacenter_reference VARCHAR(255)

Indexes ▶

7. **Reference:**

https://oceantrackingnetwork.org/about/#oceanmonitoring

https://dal.brightspace.com/d2l/le/content/221749/Home

8. **SQL Dump of Table structure and values are attached.**