In [7]:

```
pip install scikit-learn
```

```
Requirement already satisfied: scikit-learn in c:\users\shaha\appdata\loca
l\programs\python\python310\lib\site-packages (1.2.2)
Requirement already satisfied: numpy>=1.17.3 in c:\users\shaha\appdata\loc
al\programs\python\python310\lib\site-packages (from scikit-learn) (1.24.
3)
Requirement already satisfied: scipy>=1.3.2 in c:\users\shaha\appdata\loca
l\programs\python\python310\lib\site-packages (from scikit-learn) (1.10.1)
Requirement already satisfied: joblib>=1.1.1 in c:\users\shaha\appdata\loc
al\programs\python\python310\lib\site-packages (from scikit-learn) (1.2.0)
Requirement already satisfied: threadpoolctl>=2.0.0 in c:\users\shaha\appd
ata\local\programs\python\python310\lib\site-packages (from scikit-learn)
(3.1.0)
Note: you may need to restart the kernel to use updated packages.
```

In [8]:

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn import preprocessing,svm
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
```

In [9]:

```
df=pd.read_csv(r"C:\Users\shaha\Downloads\bottle.csv.zip")
df
```

```
C:\Users\shaha\AppData\Local\Temp\ipykernel_6508\3971288366.py:1: DtypeWar
ning: Columns (47,73) have mixed types. Specify dtype option on import or
set low_memory=False.
  df=pd.read_csv(r"C:\Users\shaha\Downloads\bottle.csv.zip")
```

Out[9]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.500	33.4400	NaN	25.64900
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.460	33.4400	NaN	25.65600
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.460	33.4370	NaN	25.65400
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.450	33.4200	NaN	25.64300
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.450	33.4210	NaN	25.64300
...	...	...	...	...	...	...	...	...	...
864858	34404	864859	093.4 026.4	20-1611SR-MX-310-2239-09340264-0000A-7	0	18.744	33.4083	5.805	23.87055
864859	34404	864860	093.4 026.4	20-1611SR-MX-310-2239-09340264-0002A-3	2	18.744	33.4083	5.805	23.87072
864860	34404	864861	093.4 026.4	20-1611SR-MX-310-2239-09340264-0005A-3	5	18.692	33.4150	5.796	23.88911
864861	34404	864862	093.4 026.4	20-1611SR-MX-310-2239-09340264-0010A-3	10	18.161	33.4062	5.816	24.01426

In [10]:

```
df=df[['Salnty','T_degC']]
df.columns=['Sal','Temp']
```

In [11]:

```
df.head(10)
```

Out[11]:

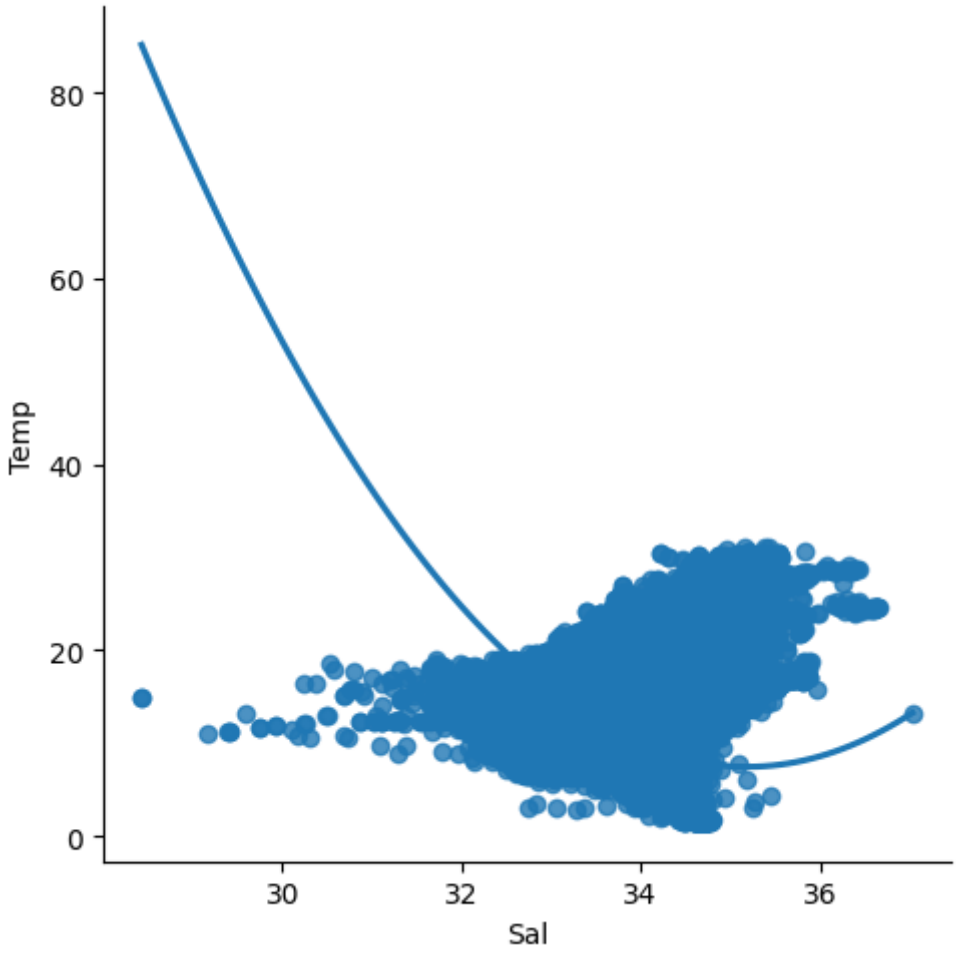
	Sal	Temp
0	33.440	10.50
1	33.440	10.46
2	33.437	10.46
3	33.420	10.45
4	33.421	10.45
5	33.431	10.45
6	33.440	10.45
7	33.424	10.24
8	33.420	10.06
9	33.494	9.86

In [14]:

```
sns.lmplot(x="Sal",y="Temp",data=df,order=2,ci=None)
```

Out[14]:

<seaborn.axisgrid.FacetGrid at 0x1e969b5ca30>



In [16]:

```
df.describe()
```

Out[16]:

	Sal	Temp
count	817509.000000	853900.000000
mean	33.840350	10.799677
std	0.461843	4.243825
min	28.431000	1.440000
25%	33.488000	7.680000
50%	33.863000	10.060000
75%	34.196900	13.880000
max	37.034000	31.140000

In [17]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 864863 entries, 0 to 864862
Data columns (total 2 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   Sal     817509 non-null  float64
 1   Temp    853900 non-null  float64
dtypes: float64(2)
memory usage: 13.2 MB
```

In [18]:

```
df.fillna(method='ffill',inplace=True)
```

```
C:\Users\shaha\AppData\Local\Temp\ipykernel_6508\4116506308.py:1: SettingW
ithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://
pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-
view-versus-a-copy)
  df.fillna(method='ffill',inplace=True)
```

In [22]:

```
x=np.array(df['Sal']).reshape(-1,1)
y=np.array(df['Temp']).reshape(-1,1)
```

In [23]:

```
df.dropna(inplace=True)
```

```
C:\Users\shaha\AppData\Local\Temp\ipykernel_6508\1379821321.py:1: SettingW
ithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-doc
s/stable/user_guide/indexing.html#returning-a-view-versus-a-copy (https://
pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-
view-versus-a-copy)
  df.dropna(inplace=True)
```

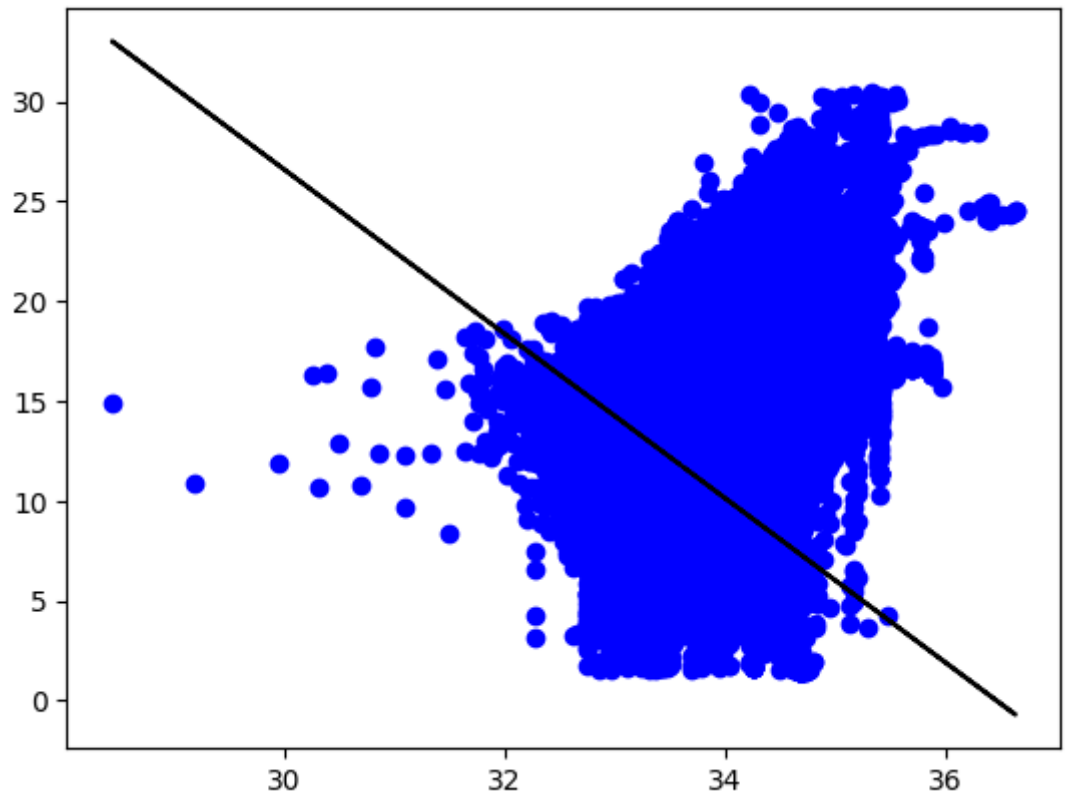
In [24]:

```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25)
regr=LinearRegression()
regr.fit(x_train,y_train)
print(regr.score(x_test,y_test))
```

```
0.20116439110701856
```

In [25]:

```
y_pred=regr.predict(x_test)
plt.scatter(x_test,y_test,color='b')
plt.plot(x_test,y_pred,color='k')
plt.show()
```

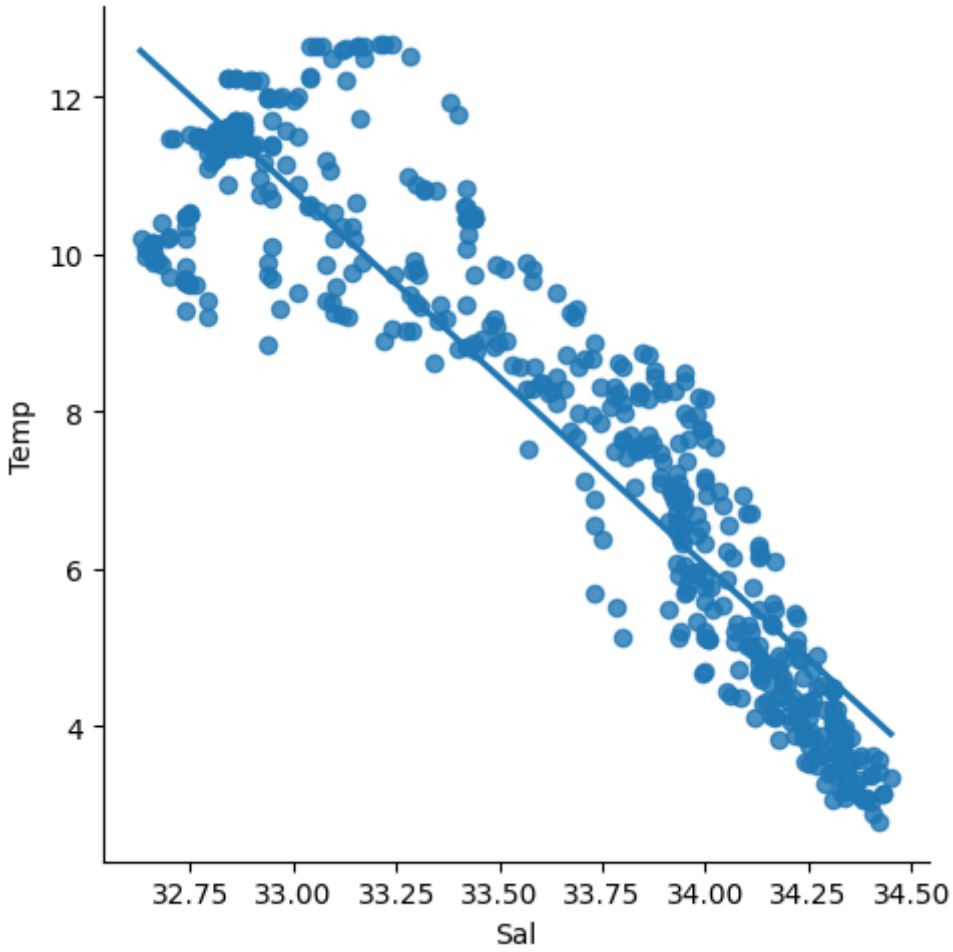


In [26]:

```
df500=df[:][:500]
sns.lmplot(x="Sal",y="Temp",data=df500,order=1,ci=None)
```

Out[26]:

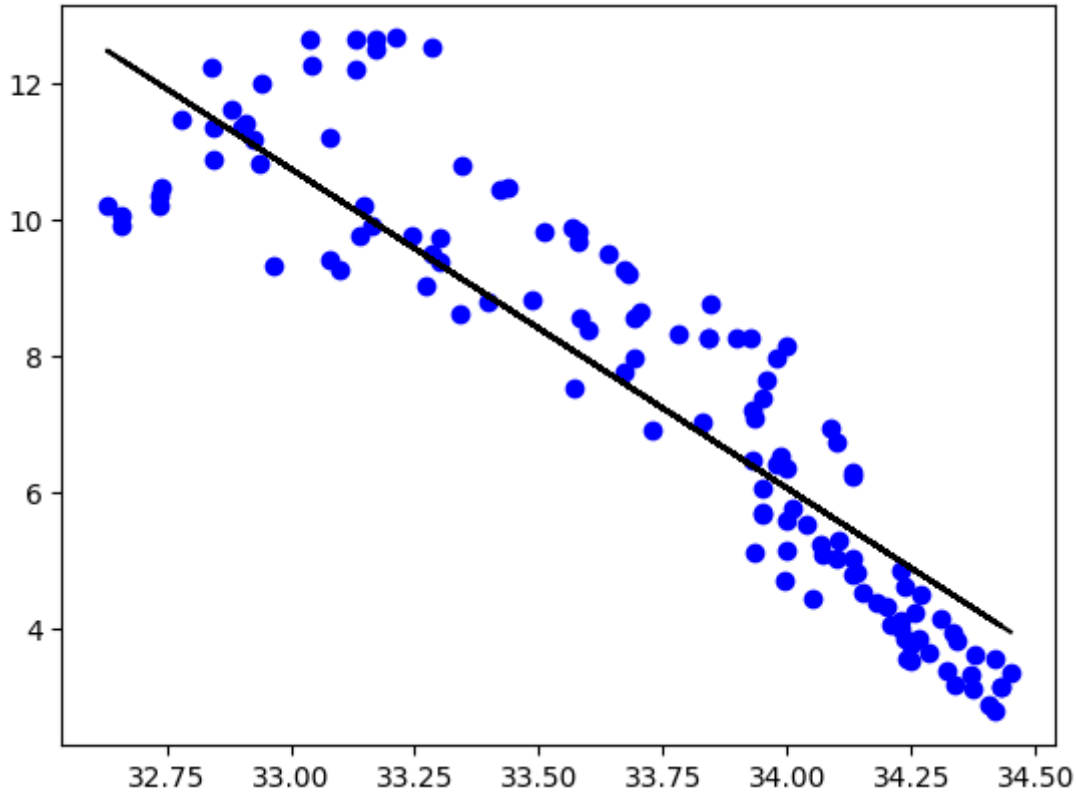
```
<seaborn.axisgrid.FacetGrid at 0x1e969bbc730>
```



In [27]:

```
df500.fillna(method='ffill',inplace=True)
x=np.array(df500['Sal']).reshape(-1,1)
y=np.array(df500['Temp']).reshape(-1,1)
df500.dropna(inplace=True)
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.25)
regr=LinearRegression()
regr.fit(x_train,y_train)
print("Regression:",regr.score(x_test,y_test))
y_pred=regr.predict(x_test)
plt.scatter(x_test,y_test,color='b')
plt.plot(x_test,y_pred,color='k')
plt.show()
```

```
Regression: 0.8276773211148568
```



In [29]:

```
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
```

In [34]:

```
model=LinearRegression()
model.fit(x_train,y_train)
y_pred=model.predict(x_test)
r2=r2_score(y_test,y_pred)
print("r2 score:",r2)
```

```
r2 score: 0.8276773211148568
```