In [120]:
```
import pandas as pd
import numpy as np
from scipy import stats

import matplotlib.pyplot as plt
%matplotlib inline
import matplotlib
from matplotlib.patches import Rectangle

import seaborn as sns

matplotlib.style.use('fivethirtyeight')
```

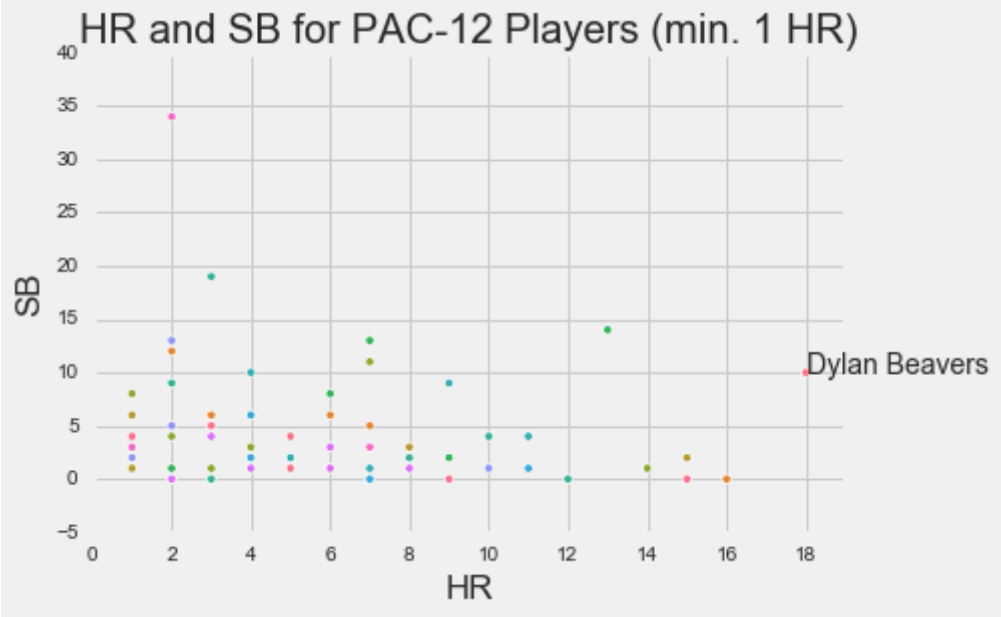
Pac-12 Leaderboard Visualizaions

In [121]:
```
pac12 = pd.read_csv("pac12_leaders.csv")
pac12.head()
```

Out[121]:

	Player	Team	POS	AVG	OBP	SLG	OPS	GP	AB	R	H	2B	3b	HR	RBI	HP	B
0	Dylan Beavers	California	CF	0.303	0.401	0.630	1.031	55	211	44	64	11	2	18	49	5	3
1	Ethan Long	Arizona State	DH	0.340	0.408	0.725	1.133	48	153	40	52	11	0	16	53	7	1
2	Jacob Berry	Arizona	DH	0.371	0.463	0.710	1.173	55	210	48	78	16	5	15	64	9	3
3	Quentin Selma	California	3B	0.291	0.368	0.544	0.912	55	206	43	60	5	1	15	47	4	2
4	Kenyon Yovan	Oregon	DH	0.319	0.419	0.596	1.015	47	188	48	60	10	0	14	51	10	2

In [122]:
```
sns.scatterplot(data=pac12, x="HR", y="SB", hue="Team",legend=None)
plt.annotate("Dylan Beavers", (18, 10))
plt.xlim([0,19])
plt.style.use('fivethirtyeight')
plt.xticks([0,2, 4, 6, 8,10,12,14,16,18])
plt.title("HR and SB for PAC-12 Players (min. 1 HR)")

plt.show()
```

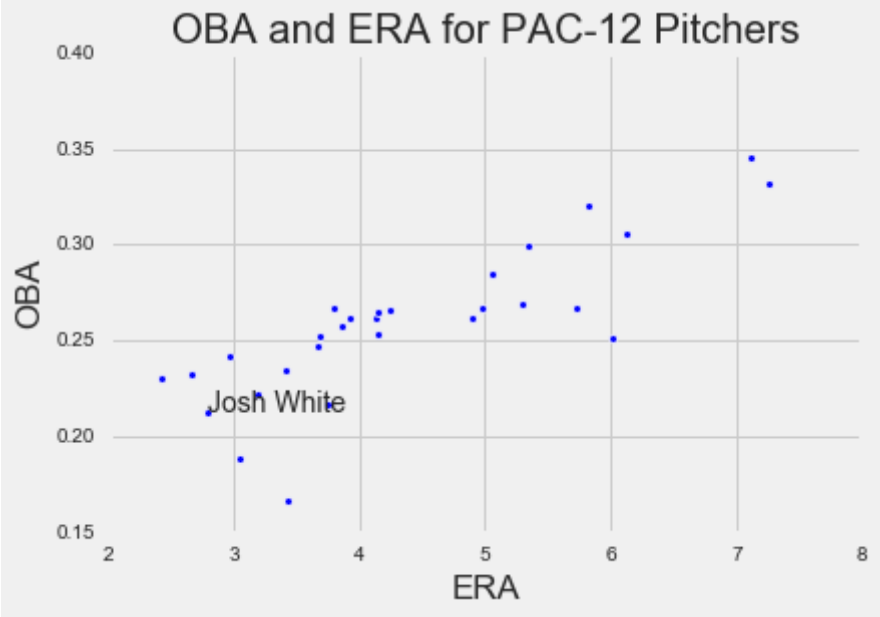


In [123]:
```
pac12_pitcher = pd.read_csv("pac12_pitchers.csv")
pac12_pitcher.head()

pac12_pitcher["K/9"] = (pac12_pitcher["SO"]/pac12_pitcher["IP"])*9
pac12_pitcher[["Player","Team","K/9"]].sort_values(by="K/9",ascending=False
```

Out[123]:

	Player	Team	K/9
7	Kevin Abel	Oregon State	12.075949
2	Josh White	California	11.931260
4	Brendan Beck	Stanford	11.093023
10	Cooper Hjerpe	Oregon State	10.875000
5	Sean Mullen	UCLA	10.711354

In [124]:
```
sns.scatterplot(data=pac12_pitcher, x="ERA", y="OBA", s=15,legend=None)
plt.annotate("Josh White", (2.79, 0.213))

plt.title("OBA and ERA for PAC-12 Pitchers")

plt.show()
```



Trackman Data Cleaning

In [125]:
```
trackman = pd.read_csv('Trackman.csv')
```

```
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/IPython/core/inte
ractiveshell.py:3020: DtypeWarning: Columns (28) have mixed types. Specif
y dtype option on import or set low_memory=False.
  interactivity=interactivity, compiler=compiler, result=result)
```

In [126]:
```
df = trackman[["Count","TaggedPitchType","AutoPitchType","PitcherTeam","Pit
df['TaggedPitchType'].replace('Undefined', np.NaN,inplace=True)
df.TaggedPitchType.fillna(df.AutoPitchType, inplace=True)
del df['AutoPitchType']
```

```
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/pandas/core/gener
ic.py:5890: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-doc
s/stable/indexing.html#indexing-view-versus-copy (http://pandas.pydata.or
g/pandas-docs/stable/indexing.html#indexing-view-versus-copy)
  self._update_inplace(new_data)
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/pandas/core/gener
ic.py:5434: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: http://pandas.pydata.org/pandas-doc
s/stable/indexing.html#indexing-view-versus-copy (http://pandas.pydata.or
g/pandas-docs/stable/indexing.html#indexing-view-versus-copy)
  self._update_inplace(new_data)
```

In [139]:
```
cleaned = pd.read_csv("cleanedTrackman.csv")
batter_cleaned = pd.read_csv("cleaned_hitters.csv")
```

In [ ]:
```

```

In [128]:
```
# Check for NaN values in columns (891 total rows)
for col in df.columns:
  col_i = df[col]
  nan_rows = col_i[col_i.isna()]
  print('There are {} NaN values in the {} column'.format(len(nan_rows), cc
```

```
There are 0 NaN values in the Count column
There are 0 NaN values in the TaggedPitchType column
There are 0 NaN values in the PitcherTeam column
There are 0 NaN values in the Pitcher column
There are 4285 NaN values in the EffectiveVelo column
```

In [129]:
```
# Replacing NaN values in EffectiveVelo and SpinRate with average associate
df.groupby(['TaggedPitchType']).mean()
```

Out[129]:

TaggedPitchType	EffectiveVelo
ChangeUp	79.397572
Curveball	74.709215
Cutter	83.692053
Fastball	87.916834
Knuckleball	61.873290
Other	75.522969
Sinker	86.721276
Slider	77.875216
Splitter	79.877514
Undefined	86.607004

In [130]:
```
df['EffectiveVelo'].fillna(df.groupby(["TaggedPitchType"])["EffectiveVelo"]
```

Percentile Rank of Fastball Velocity

In [131]:
```
df_fb = df[df["TaggedPitchType"] == "Fastball"]
avg_all_pitchers = df_fb.groupby(['Pitcher',"PitcherTeam"]).mean()
avg_all_pitchers['Rank'] = avg_all_pitchers['EffectiveVelo'].rank(method='d
avg_all_pitchers = avg_all_pitchers.reset_index(level="PitcherTeam")
avg_all_pitchers["Rank"] = avg_all_pitchers["Rank"] * 100

avg_all_pitchers.sample(20)
```

Out[131]:

Pitcher	PitcherTeam	EffectiveVelo	Rank
Stillman, Josh	ALA_LIO	82.234888	12.794503
Sachse, Austin	SOU_RED	82.937746	16.982984
Longsworth, Landon	ULM_WAR	88.202982	68.520942
Ksiazek, Tyler	MON_HAW	85.713440	38.776178
Calderon, Alexis	MAN_JAS	86.873303	53.304974
Hill, Jaden	LSU_TIG	92.117648	96.302356
Morrow, Cody	UAH_C	90.932411	91.557592
DiMartino, Anthony	GBC_LIG	82.278646	12.892670
Swanson, Kyle	NOR_DEM	88.834066	75.556283
Elliott, Jensen	OKL_COW	88.891076	76.178010
Casstevens, Ben	WAK_DEA	61.992624	0.065445
Billen, Jared	CAL_LAN	86.145480	44.011780
Martin, Kyle	FOR_RAM	92.009238	95.844241
Matthews, John	KSU	89.900531	84.882199
Mitchell, Brandon	NEW_PRI	85.864663	40.543194
Earles, Wes	WRI_RAI	85.796094	39.888743
Keenan, Zach	MTSU_BLU	87.253853	58.049738
Hodo, David	NOR_DEM	82.818082	16.099476
George, Aaron	LSU_TIG	89.626330	82.722513
Jones, Stephen	SAM_BUL	92.042681	95.975131

In [132]:
```
bears = avg_all_pitchers[avg_all_pitchers["PitcherTeam"] == "CAL_BEA"]
bears["Rank"].to_dict()
```

Out[132]:
```
{'Ammirato, Joe': 60.43848167539267,
 'Delmore, Jack': 28.959424083769637,
 'Gather, Lucas': 48.29842931937173,
 'Hinrichsen, Jack': 40.11780104712042,
 'Holman, Grant': 91.68848167539268,
 'Horn, Jared': 80.6282722513089,
 'Olson, Carson': 31.282722513089006,
 'Oswait, Connor': 8.44240837696335,
 'Proctor, Nick': 39.3651832460733,
 'Reyes, Rogelio': 78.20680628272252,
 'Sabouri, Arman': 57.55890052356021,
 'Scott, Mitchell': 28.893979057591622,
 'Stoutenborough, Sam': 38.57984293193717,
 'Sullivan, Sean': 88.97251308900523,
 'Villers, Ian': 85.47120418848168,
 'Wolger, Jack': 12.958115183246074}
```

Percentile Rank of Fastball Spin

In [133]:
```
df1 = trackman[['SpinRate',"Count","TaggedPitchType","AutoPitchType","Pitch
# Check for NaN values in columns (891 total rows)
for col in df1.columns:
  col_i = df1[col]
  nan_rows = col_i[col_i.isna()]
  print('There are {} NaN values in the {} column'.format(len(nan_rows), cc
```

```
There are 11233 NaN values in the SpinRate column
There are 0 NaN values in the Count column
There are 0 NaN values in the TaggedPitchType column
There are 0 NaN values in the AutoPitchType column
There are 0 NaN values in the PitcherTeam column
There are 0 NaN values in the Pitcher column
```

In [134]:
```
df1['SpinRate'].fillna(df1.groupby(["TaggedPitchType"])["SpinRate"].transfc
df1.head()
```

Out[134]:

	SpinRate	Count	TaggedPitchType	AutoPitchType	PitcherTeam	Pitcher
0	2018.093680	0-0	ChangeUp	Fastball	TUS_PIO	Becker, Gunner
1	2078.394274	1-0	Fastball	Fastball	TUS_PIO	Becker, Gunner
2	2046.732249	2-0	Fastball	Fastball	TUS_PIO	Becker, Gunner
3	2036.471128	2-1	Fastball	Fastball	TUS_PIO	Becker, Gunner
4	2043.714448	3-1	Fastball	Fastball	TUS_PIO	Becker, Gunner

In [135]:
```
df_fb1 = df1[df1["TaggedPitchType"] == "Fastball"]
avg_all_pitchers_spin = df_fb1.groupby(['Pitcher',"PitcherTeam"]).mean()
avg_all_pitchers_spin['Rank'] = avg_all_pitchers_spin['SpinRate'].rank(meth
avg_all_pitchers_spin = avg_all_pitchers_spin.reset_index(level="PitcherTea
avg_all_pitchers_spin["Rank"] = avg_all_pitchers_spin["Rank"] * 100
```

In [136]:
```
bears1 = avg_all_pitchers_spin[avg_all_pitchers_spin["PitcherTeam"] == "CAL
bears1["Rank"].to_dict()
```

Out[136]:
```
{'Ammirato, Joe': 79.19597989949749,
 'Delmore, Jack': 0.6700167504187605,
 'Gather, Lucas': 26.063651591289783,
 'Hinrichsen, Jack': 47.06867671691792,
 'Holman, Grant': 29.380234505862646,
 'Horn, Jared': 53.19932998324958,
 'Olson, Carson': 16.81742043551089,
 'Oswait, Connor': 10.117252931323282,
 'Proctor, Nick': 84.79061976549414,
 'Reyes, Rogelio': 48.14070351758794,
 'Sabouri, Arman': 10.954773869346733,
 'Scott, Mitchell': 44.62311557788945,
 'Stoutenborough, Sam': 37.68844221105528,
 'Sullivan, Sean': 86.63316582914572,
 'Villers, Ian': 64.22110552763819,
 'Wolger, Jack': 11.423785594639865}
```

Percentile Rank of Batter Average Exit Velo

In [140]:
```
# Check for NaN values in columns (891 total rows)
for col in batter_cleaned.columns:
  col_i = batter_cleaned[col]
  nan_rows = col_i[col_i.isna()]
  print('There are {} NaN values in the {} column'.format(len(nan_rows), cc
```

```
There are 0 NaN values in the Batter column
There are 0 NaN values in the BatterTeam column
There are 319284 NaN values in the ExitSpeed column
There are 282994 NaN values in the xwOBA column
```

In [141]:
```
# Cleans for rows with exit velocities (batted ball outcomes only)
exit_velo = batter_cleaned[["Batter","BatterTeam","ExitSpeed"]][batter_clea


avg_exit_velo = exit_velo.groupby(['Batter',"BatterTeam"]).mean()
avg_exit_velo['Rank'] = avg_exit_velo['ExitSpeed'].rank(method='dense', asc
avg_exit_velo = avg_exit_velo.reset_index(level="BatterTeam")
avg_exit_velo["Rank"] = avg_exit_velo["Rank"] * 100

# Cal Batters Percentile Rankings for Exit Velo
bears_exit_velo = avg_exit_velo[avg_exit_velo["BatterTeam"] == "CAL_BEA"]
bears_exit_velo["Rank"].to_dict()
```

Out[141]:
```
{'Baker, Darren': 47.827179100728465,
 'Bock, Conner': 93.293142426526,
 'Cachola, Sam': 96.60889223813113,
 'Eden, Cameron': 68.34966088922381,
 'Elvis, Cole': 83.72268274302938,
 'Flower, Max': 73.37352424014067,
 'Henderson, Tommy': 85.63175081637779,
 'Holman, Grant': 88.24415975885455,
 'Lagattuta, John': 58.57824667169053,
 'Lee, Korey': 91.63526752072345,
 'Mack, Connor': 57.09620698317006,
 'McIlwain, Brandon': 78.27179100728459,
 'Mcllwain, Brendon': 82.99422255714644,
 'Nielsen, Garrett': 81.53730218538055,
 'Selma, Quentin': 89.17357447877417,
 'Smith, Hance': 83.37101230846521,
 'Sullivan, Sean': 81.08515448379804,
 'Suoto, Dom ': 0.728460185882944,
 'Vaughn, Andrew': 94.64958553127354,
 'Wezniak, Sam': 75.50866616428034,
 'Wolger, Jack': 96.38281838733987}
```

Percentile Rank of Batter Max Exit Velo

In [142]:
```
max_exit_velo = exit_velo.groupby(['Batter',"BatterTeam"]).max()
max_exit_velo['Rank'] = max_exit_velo['ExitSpeed'].rank(method='dense', asc
max_exit_velo = max_exit_velo.reset_index(level="BatterTeam")
max_exit_velo["Rank"] = max_exit_velo["Rank"] * 100

# Cal Batters Percentile Rankings for Exit Velo
bears_exit_velo = max_exit_velo[max_exit_velo["BatterTeam"] == "CAL_BEA"]
bears_exit_velo["Rank"].to_dict()
```

Out[142]:
```
{'Baker, Darren': 46.614648879939594,
 'Bock, Conner': 90.71230807953687,
 'Cachola, Sam': 29.37326956959476,
 'Eden, Cameron': 87.28920211427133,
 'Elvis, Cole': 74.98112257739743,
 'Flower, Max': 90.81298766675057,
 'Henderson, Tommy': 14.246161590737477,
 'Holman, Grant': 96.8285930027687,
 'Lagattuta, John': 90.183740246665,
 'Lee, Korey': 97.83538887490562,
 'Mack, Connor': 91.81978353888749,
 'McIlwain, Brandon': 97.7095393908885,
 'Mcllwain, Brendon': 75.98791844953435,
 'Nielsen, Garrett': 81.82733450792851,
 'Selma, Quentin': 88.220488295998,
 'Smith, Hance': 75.18248175182481,
 'Sullivan, Sean': 68.8396677573622,
 'Suoto, Dom ': 0.5537377296753083,
 'Vaughn, Andrew': 99.94966020639315,
 'Wezniak, Sam': 91.31638560281903,
 'Wolger, Jack': 28.567832871885223}
```

Pitch Type Probabilities

Most likely pitch type for certain counts.

In [143]:
```
def conditional_pitch_type_probabilities(dataframe , team , pitcher):
    '''
    Using Trackman data, this displays the probabiility of pitch types for

    RETURNS: Dataframe of pitch type distribution for all possible counts
    '''
    df = trackman[["Count","TaggedPitchType","AutoPitchType","PitcherTeam",
    df['TaggedPitchType'].replace('Undefined', np.NaN,inplace=True)
    df.TaggedPitchType.fillna(df.AutoPitchType, inplace=True)
    del df['AutoPitchType']
    team = df[df["PitcherTeam"] == team]
    df = team[df["Pitcher"] == pitcher]
    df = df.rename(columns={"TaggedPitchType":"PitchType"})
    x = df.groupby(["Count"]).count()["PitchType"]
    conditional = df.groupby('Count')['PitchType'].value_counts() / df.grou
    return conditional.unstack(level=1).fillna(0).transpose().round(2)

def highlight_max(s):
    '''
    highlight the maximum in a Series yellow.
    '''
    is_max = s == s.max()
    return ['background-color: yellow' if v else '' for v in is_max]

x = conditional_pitch_type_probabilities(cleaned,'MIN_GOL','Meyer, Max')
cm = sns.light_palette("red", as_cmap=True)
s = x.style.background_gradient(cmap=cm)
```

```
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/ipykernel_launche
r.py:12: UserWarning: Boolean Series key will be reindexed to match DataF
rame index.
  if sys.path[0] == '':
```

In [144]:
```
# html = x.to_html(index_names=False)
# print(html)
s
```

Out[144]:

Count	0-0	0-1	0-2	1-0	1-1	1-2	2-0	2-1	2-2	3-0	3-1	3-2
PitchType												
ChangeUp	0.15	0.14	0.09	0.02	0.08	0.09	0.05	0	0.04	0.18	0	0.03
Cutter	0.01	0.02	0	0.04	0.03	0.02	0	0	0.02	0	0	0.03
Fastball	0.42	0.44	0.29	0.26	0.38	0.39	0.26	0.28	0.28	0.64	0.47	0.1
Slider	0.41	0.41	0.63	0.69	0.51	0.5	0.68	0.72	0.66	0.18	0.53	0.83

Strike Zone Visualizations

In [149]:
```
cal_batters = trackman[trackman['BatterTeam']== 'CAL_BEA']
cal_pitchers = trackman[trackman['PitcherTeam']== 'CAL_BEA']
cal_batter_pitch_locs = cal_batters[["Batter","PlateLocHeight","PlateLocSid
cal_batter_pitch_locs["PlateLocSide"].max()
```

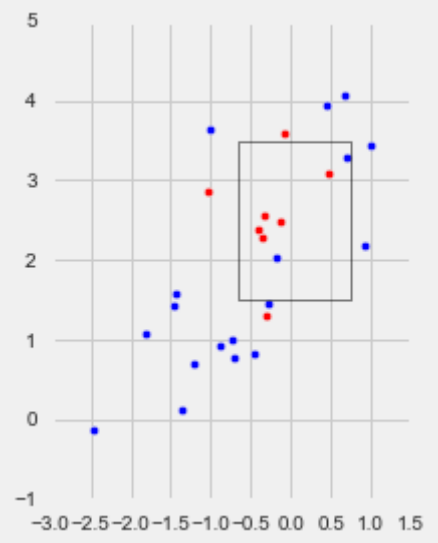
Out[149]:
```
3.5154980000000005
```

In [150]:
```
# Lowest Point in strike zone = -2.232843
# Highest Point in the strike zone = 6.3406970000000005
# Furtherest to the Left from pitchers' perspective = -3.3767199999999997
# Furtherest to the Right from pitchers' perspective = 3.3443379999999996

# Average Height of BOTTOM of the ACTUAL strike zone (called strikes) = 1.7
# Average Height of TOP of the ACTUAL strike zone (called strikes) = 3.42
```

In [151]:
```
# Look into selecting pitchers rather than manually entering
cal_pitch_locs = cal_pitchers[["Pitcher","PlateLocHeight","PlateLocSide","T

def cal_pitcher_plots(pitcher, pitch_type):
    pitcher_pitches = cal_pitch_locs[cal_pitch_locs["Pitcher"] == pitcher]
    pitcher_pitchtype = pitcher_pitches[pitcher_pitches["TaggedPitchType"]=

    balls = pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "BallCalled
    called_strikes = pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "S
    swinging_strikes =pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "

    plt.scatter(balls["PlateLocSide"], balls['PlateLocHeight'], c="b")
    plt.scatter(called_strikes["PlateLocSide"], called_strikes['PlateLocHei
    plt.scatter(swinging_strikes["PlateLocSide"], swinging_strikes['PlateLo

    plt.axes()
    rectangle = plt.Rectangle((-8/12,1.5), 17/12, 2, facecolor='none',ec="b
    plt.gca().add_patch(rectangle)
    plt.axis('scaled')

    plt.show()
```

In [152]:
```
cal_pitcher_plots('Holman, Grant' , 'Slider')
```

```
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/matplotlib/figur
e.py:98: MatplotlibDeprecationWarning:
Adding an axes using the same arguments as a previous axes currently reus
es the earlier instance.  In a future version, a new instance will always
be created and returned.  Meanwhile, this warning can be suppressed, and
the future behavior ensured, by passing a unique label to each axes insta
nce.
  "Adding an axes using the same arguments as a previous axes "
```



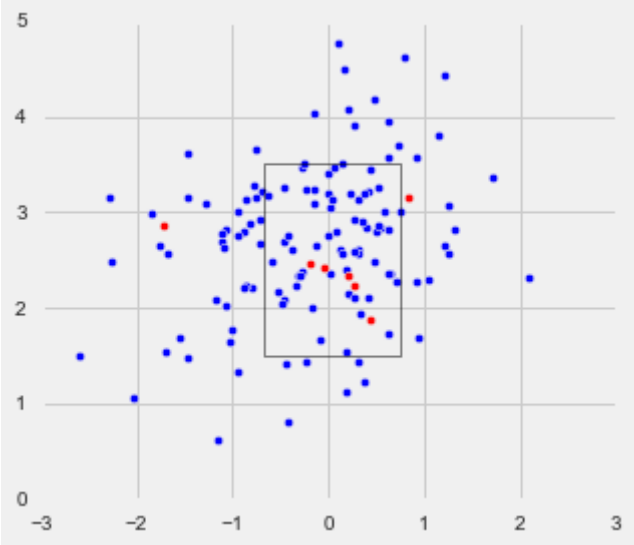
Pitching Scouting Report Visualizations

In [153]:
```
# Plot Spray Plot of Balls/Strikes for Opposing team for specified pitches
def pitcher_strike_plot(pitcher, pitch_type, team):
    team_pitchers = trackman[trackman['PitcherTeam']== team]


    pitcher_pitches = team_pitchers[team_pitchers["Pitcher"] == pitcher]
    pitcher_pitchtype = pitcher_pitches[pitcher_pitches["TaggedPitchType"]=

    balls = pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "BallCalled
    called_strikes = pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "S
    swinging_strikes =pitcher_pitchtype[pitcher_pitchtype["PitchCall"] == "

    plt.scatter(balls["PlateLocSide"], balls['PlateLocHeight'], c="b")
    plt.scatter(called_strikes["PlateLocSide"], called_strikes['PlateLocHei
    plt.scatter(swinging_strikes["PlateLocSide"], swinging_strikes['PlateLo

    plt.axes()
    rectangle = plt.Rectangle((-8/12,1.5), 17/12, 2, facecolor='none',ec="b
    plt.gca().add_patch(rectangle)
    plt.axis('scaled')

    plt.show()
```

In [154]:
```
# Plots Spray Plot of Hits and Non-Hits (Red Denotes a hit, blue represents
def pitcher_hit_plot(pitcher, pitch_type, team):
    team_pitchers = trackman[trackman['PitcherTeam']== team]


    pitcher_pitches = team_pitchers[team_pitchers["Pitcher"] == pitcher]
    pitcher_pitchtype = pitcher_pitches[pitcher_pitches["TaggedPitchType"]==

#     singles = pitcher_pitchtype[pitcher_pitchtype["PlayResult"] == "Single
#     doubles = pitcher_pitchtype[pitcher_pitchtype["PlayResult"] == "Double
#     trips =pitcher_pitchtype[pitcher_pitchtype["PlayResult"] == "Triple"]
#     homer = pitcher_pitchtype[pitcher_pitchtype["PlayResult"] == "HomeRun"

    hit = pitcher_pitchtype[(pitcher_pitchtype["PlayResult"] == "Single") |
                            (pitcher_pitchtype["PlayResult"] =="HomeRun") |
                            (pitcher_pitchtype["PlayResult"] =="Double") |
                            (pitcher_pitchtype["PlayResult"] == "Triple")]
    nonhit = pitcher_pitchtype[(pitcher_pitchtype["PlayResult"] == "Undefine
                               (pitcher_pitchtype["PlayResult"] == "Error")

    plt.scatter(nonhit["PlateLocSide"], nonhit['PlateLocHeight'], c="b")
    plt.scatter(hit["PlateLocSide"], hit['PlateLocHeight'], c="r")


    plt.axes()
    rectangle = plt.Rectangle((-8/12,1.5), 17/12, 2, facecolor='none',ec="bl
    plt.gca().add_patch(rectangle)
    plt.axis('scaled')

    plt.show()
```

In [155]:
```
pitcher_hit_plot('Holman, Grant' , 'Fastball',"CAL_BEA")
```

```
/Users/tylernunez/anaconda3/lib/python3.7/site-packages/matplotlib/figur
e.py:98: MatplotlibDeprecationWarning:
Adding an axes using the same arguments as a previous axes currently reus
es the earlier instance.  In a future version, a new instance will always
be created and returned.  Meanwhile, this warning can be suppressed, and
the future behavior ensured, by passing a unique label to each axes insta
nce.
  "Adding an axes using the same arguments as a previous axes "
```



USF 2/26 Analysis

In [156]:
```
usf_pitchers = trackman[trackman['PitcherTeam']== 'SAN_DON']
df = usf_pitchers[["TaggedPitchType","AutoPitchType","Pitcher",'EffectiveVe
df['TaggedPitchType'].replace('Undefined', np.NaN,inplace=True)
df.TaggedPitchType.fillna(df.AutoPitchType, inplace=True)
df1 = df[["Pitcher",'SpinRate','EffectiveVelo','TaggedPitchType']]

df1.head()
```

Out[156]:

	Pitcher	SpinRate	EffectiveVelo	TaggedPitchType
158295	Young, Grant	1616.841	78.29855	Fastball
158296	Young, Grant	1265.168	70.92918	ChangeUp
158297	Young, Grant	1607.139	77.28404	Fastball
158298	Young, Grant	1671.900	78.87868	Fastball
158299	Young, Grant	1078.225	70.22093	ChangeUp

In [157]:
```
df1.groupby(['TaggedPitchType',"Pitcher"]).mean()
```

Out[157]:

		SpinRate	EffectiveVelo
TaggedPitchType	**Pitcher**		
ChangeUp	**Barchus, Jordan**	1368.487000	74.261450
	Koppelmaa, Kasey	1235.078400	68.952355
	Washburn, Julian	1663.830333	69.890490
	Young, Grant	1186.040684	68.961695
Curveball	**Washburn, Julian**	2018.090333	66.912880
	Young, Grant	1924.945000	54.420127
Fastball	**Barchus, Jordan**	1783.646556	79.285349
	Koppelmaa, Kasey	1867.206600	76.795772
	Mollerus, Josh	2199.926680	85.233626
	Post, Benji	1419.662286	77.403754
	Washburn, Julian	2065.017852	84.016149
	Young, Grant	1636.681500	77.310721
Slider	**Barchus, Jordan**	2431.644750	69.891565
	Koppelmaa, Kasey	2241.310500	70.451585
	Mollerus, Josh	1992.291500	71.976205
	Washburn, Julian	2084.591000	68.500980
	Young, Grant	2148.959727	61.740784

In [158]:
```
# Stoutenborough Pitch Mix
cal_pitchers = trackman[trackman['PitcherTeam']== 'CAL_BEA']
d = cal_pitchers[["TaggedPitchType","AutoPitchType","Pitcher",'EffectiveVel
d['TaggedPitchType'].replace('Undefined', np.NaN,inplace=True)
d.TaggedPitchType.fillna(df.AutoPitchType, inplace=True)
df2 = d[["Pitcher",'SpinRate','EffectiveVelo','TaggedPitchType']]

stoutenborough = df2[df2["Pitcher"] == "Stoutenborough, Sam"]
stoutenborough.groupby(['TaggedPitchType',"Pitcher"]).mean()
```

Out[158]:

		SpinRate	EffectiveVelo
TaggedPitchType	**Pitcher**		
ChangeUp	**Stoutenborough, Sam**	1317.534292	77.875166
Curveball	**Stoutenborough, Sam**	2308.773161	72.043740
Fastball	**Stoutenborough, Sam**	2057.060798	85.696572
Sinker	**Stoutenborough, Sam**	2034.392947	84.800791
Slider	**Stoutenborough, Sam**	2158.061271	75.448302

In [ ]:
```
```