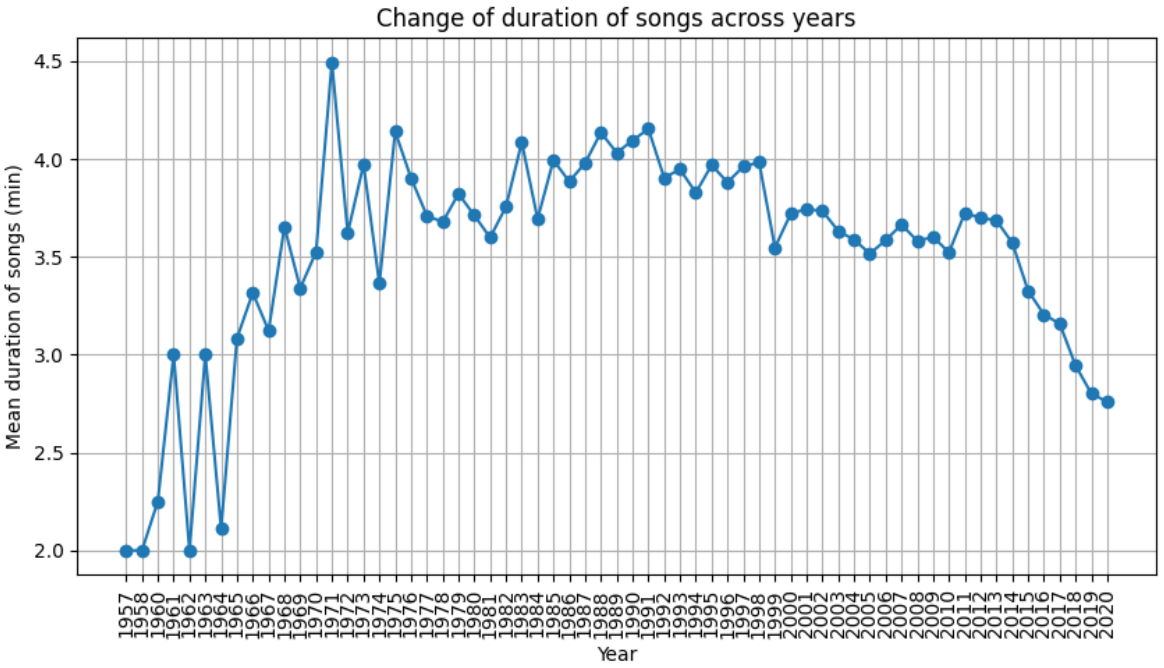
In [74]:
```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
import os
from dotenv import load_dotenv
```

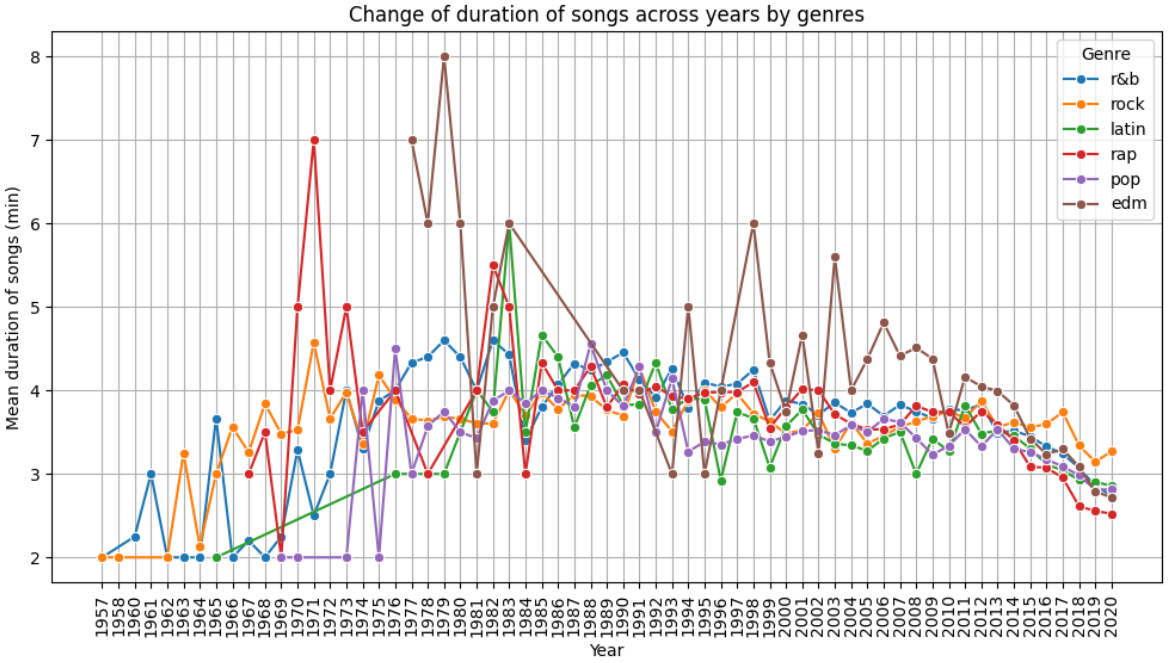
In [75]:
```
load_dotenv()
db_host = os.environ.get('DB_HOST')
db_port = os.environ.get('DB_PORT')
db_name = os.environ.get('DB_NAME')
db_user = os.environ.get('DB_USER')
db_pass = os.environ.get('DB_PASS')
db_conn_uri = f'postgresql://{db_user}:{db_pass}@{db_host}:{db_port}/{db_
```

In [76]:
```
df = pd.read_sql("SELECT * FROM song;", db_conn_uri)
```

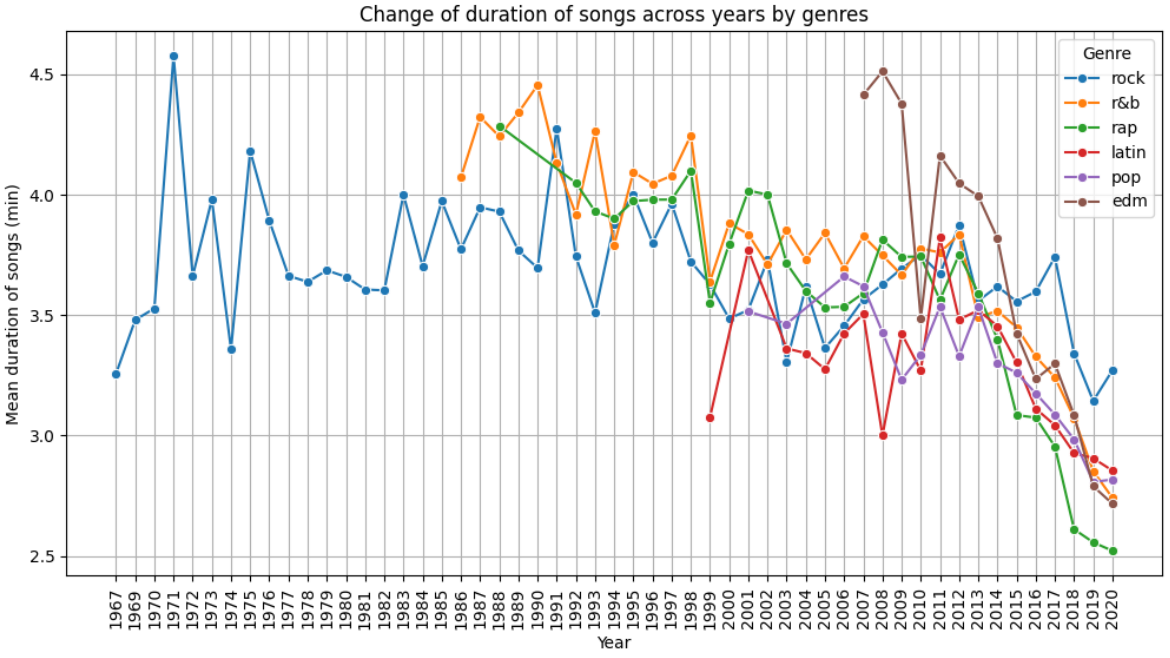
In [77]:
```
df_grouped = df.groupby("track_year")["duration_fullmin"].mean().reset_in
plt.figure(figsize=(10, 5))
plt.plot(df_grouped["track_year"], df_grouped["duration_fullmin"], marker
plt.xlabel("Year")
plt.ylabel("Mean duration of songs (min)")
plt.xticks(rotation=90)
plt.title("Change of duration of songs across years")
plt.grid()
plt.show()
```



In [78]:
```
df_grouped = df.groupby(["track_year", "playlist_genre"])["duration_fullm
plt.figure(figsize=(12, 6))
sns.lineplot(data=df_grouped, x="track_year", y="duration_fullmin", hue="
plt.xlabel("Year")
plt.ylabel("Mean duration of songs (min)")
plt.xticks(rotation=90)
plt.title("Change of duration of songs across years by genres")
plt.legend(title="Genre")
plt.grid()
plt.show()
```

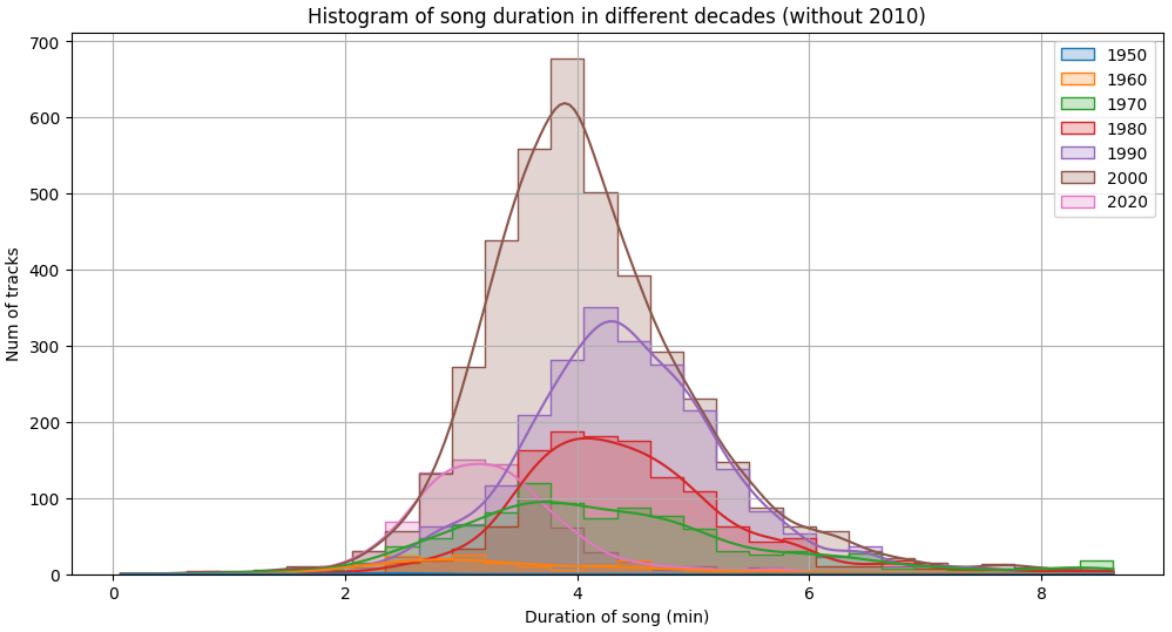


In [79]:
```
df_grouped = df.groupby(["track_year", "playlist_genre"])["duration_fullm
df_filtered = df_grouped[df_grouped["count"] > 25].reset_index()
plt.figure(figsize=(12, 6))
sns.lineplot(data=df_filtered, x="track_year", y="mean", hue="playlist_ge
plt.xlabel("Year")
plt.ylabel("Mean duration of songs (min)")
plt.xticks(rotation=90)
plt.title("Change of duration of songs across years by genres")
plt.legend(title="Genre")
plt.grid()
plt.show()
```

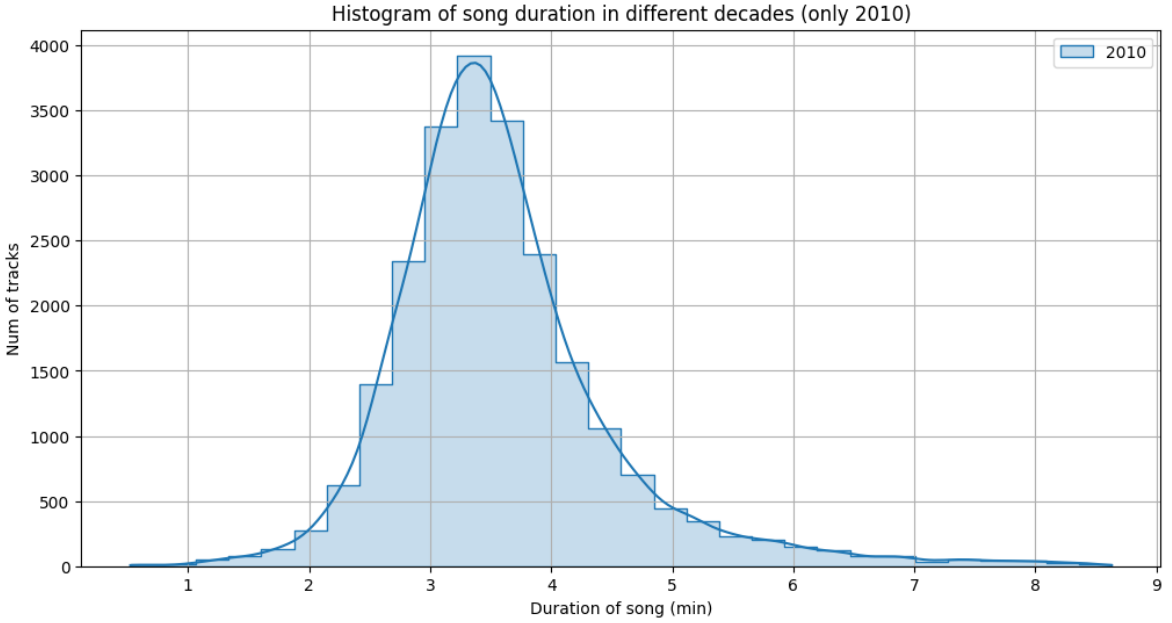


In [85]:
```
plt.figure(figsize=(12, 6))
df_filtered = df[df["track_decade"] != 2010]
ax = sns.histplot(df_filtered, x="duration_min", hue="track_decade", bins
ax.get_legend().set_title("")
plt.xlabel("Duration of song (min)")
plt.ylabel("Num of tracks")
```

```
plt.title("Histogram of song duration in different decades (without 2010)")
plt.grid()
plt.show()
```

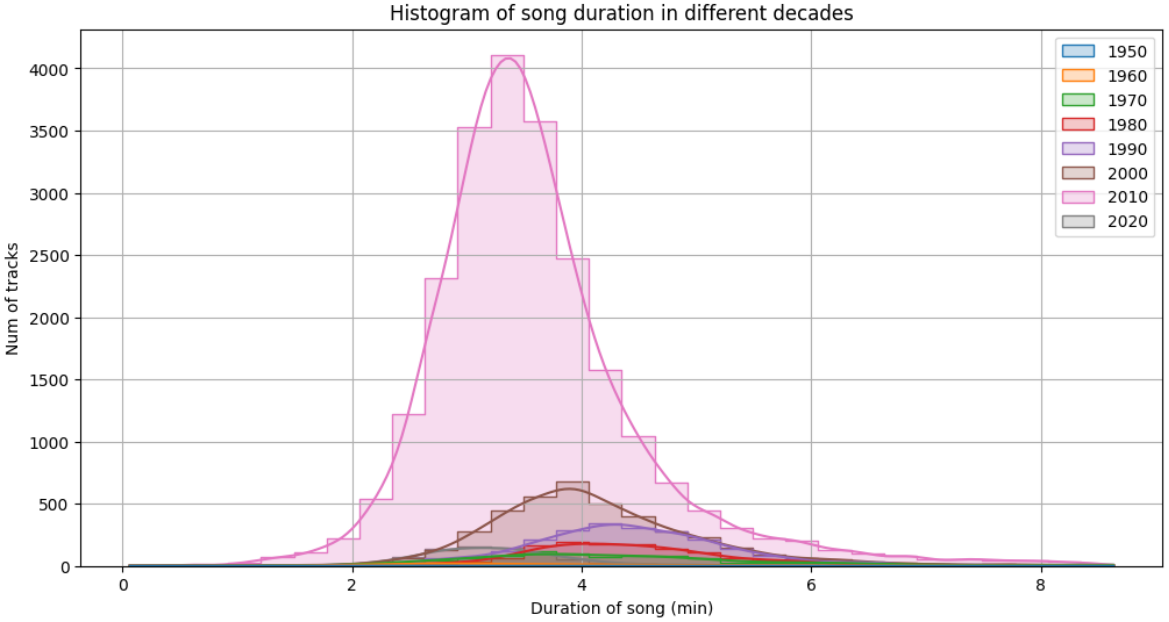


In [84]:
```
plt.figure(figsize=(12, 6))
df_filtered = df[df["track_decade"] == 2010]
ax = sns.histplot(df_filtered, x="duration_min", hue="track_decade", bins
ax.get_legend().set_title("")
plt.xlabel("Duration of song (min)")
plt.ylabel("Num of tracks")
plt.title("Histogram of song duration in different decades (only 2010)")
plt.grid()
plt.show()
```



In [83]:
```
plt.figure(figsize=(12, 6))
ax = sns.histplot(df, x="duration_min", hue="track_decade", bins=30, elem
ax.get_legend().set_title("")
plt.xlabel("Duration of song (min)")
plt.ylabel("Num of tracks")
plt.title("Histogram of song duration in different decades")
plt.grid()
```

```
plt.show()
```


Histogram of song duration in different decades
Num of tracks
Duration of song (min)
1950
1960
1970
1980
1990
2000
2010
2020
0
500
1000
1500
2000
2500
3000
3500
4000
0
2
4
6
8