

Analysis of Submarine Maintenance Delays at PHNSY

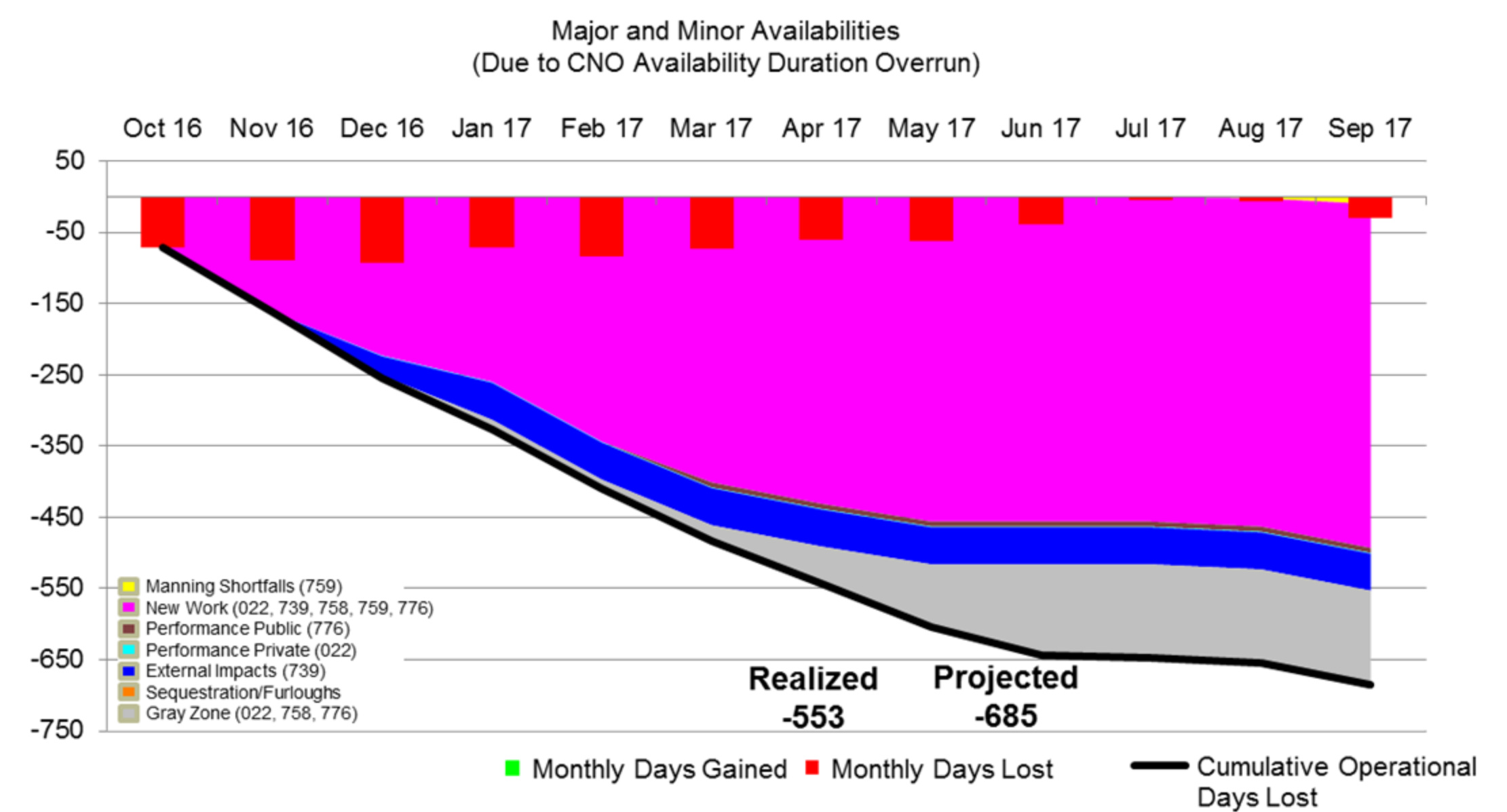


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Abstract

Pearl Harbor Naval Shipyard (PHNSY) has experienced increased delays causing a significant decrease in Operational Availability (Ao). This analysis attempts to first define the problem quantitatively and then to identify possible causes/correlations through the use of historical data from previous 688 class submarine maintenance periods collected from PHNSY.

Projected Cumulative Operational Days



Projected Number of Submarine Op Years Lost

Chart provided by SUBPAC N4

Problem:

- ~~Increased Costs?~~
- ✓ Increased Late Days?
- ~~Increased Work Demand?~~

Direct Cause of parts failure:

- ~~Due to increased age?~~
- ~~Due to increased Work?~~
- ~~Due to increased Labor Costs?~~

Assume:

- ✓ Late Days caused by parts failure late in availability

- Due to decreased Parts Reliability? (MTBF)
- Due to increased deferred work? (Budget/Capacity)
- Due to change in Op-Interval (48 to 72 month)

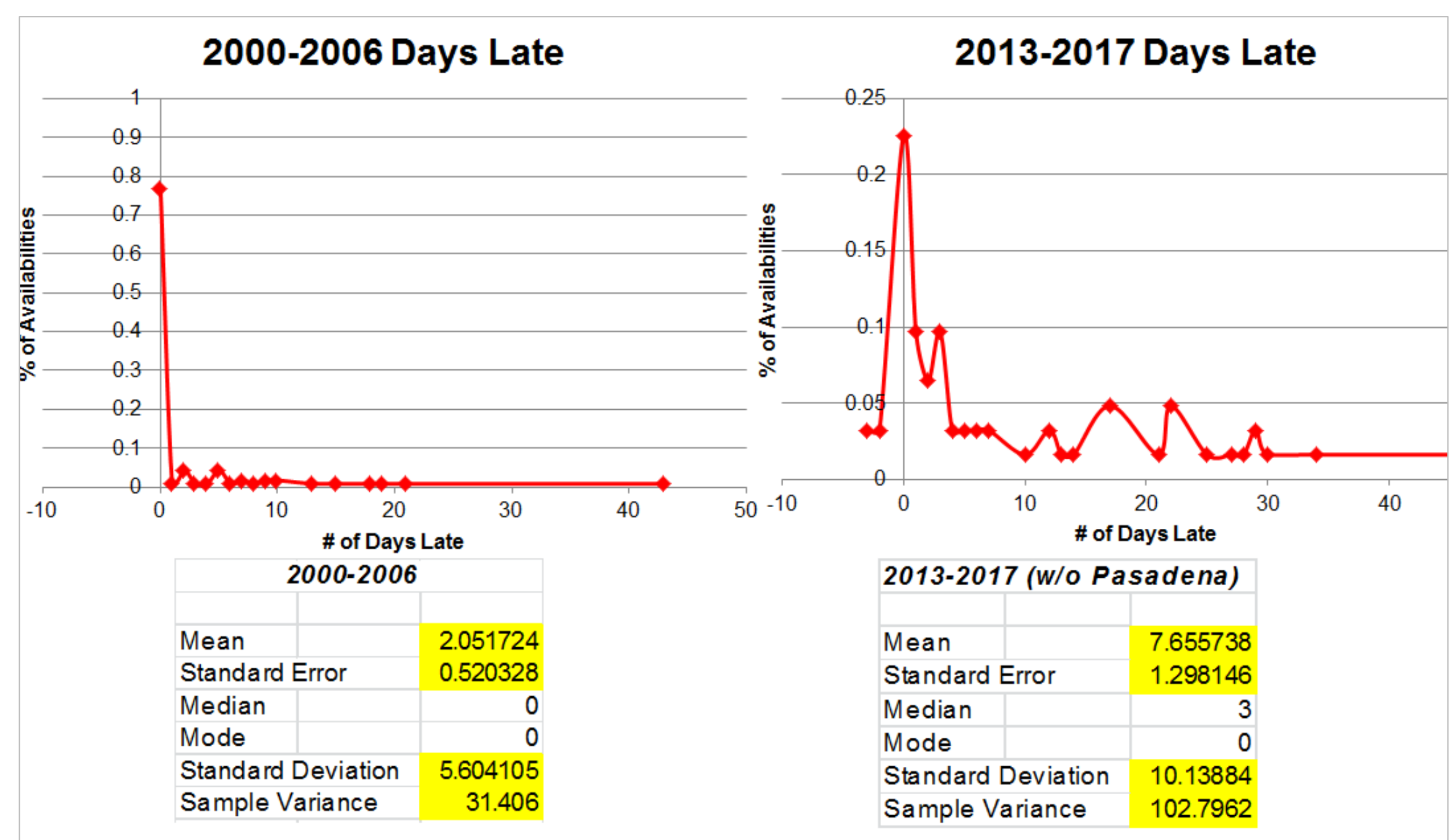
Analysis Strategy

Methods

- Narrow Scope of Analysis to:
 - 688 class submarines exclusively
 - PHNSY I-level availabilities
- Data collected from multiple PH sources 2000-2017
- Cost data corrected to CY dollars
- Regression Analysis done to show possible correlations between possible factors affecting the increase in Days Late

Results

- Eliminated the notion that availabilities cost more as CY cost has slightly decreased.
- Confirmed significant increase in Duration and Day's Late per availability from 2000 to 2017.
- Eliminated possible contributing factors of age at time of availability, workload per availability, and labor costs.



Histogram of Day's Late per Maintenance Period

Recommendations

- Additional data collection and data analysis is required to complete investigation into all possible contributing factors causing lost Ao.
- This research is the first step in solving the extremely complex problem of submarine maintenance.
- Several follow-on NPS Student Thesis Work will build off this initial data collection and analysis.