*International Civil Aviation Organization*

**Thirtieth Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/30)**

Bangkok, Thailand, 14 – 17 July 2025

**Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs**

# 2024 CENTRAL EAST PACIFIC TRAFFIC FLOW ASSESSMENT

(Presented by the United States/PARMO)

**SUMMARY**

This paper presents the 2024 vertical risk assessment for the Central East Pacific (CEP) traffic flow in Pacific airspace. This area was designated as a hot spot (Hot Spot N) at RASMAG/24. The analysis for calendar year 2024 shows a continued trend in the reported LHD category E for the CEP traffic flow.

## 1. INTRODUCTION

1.1 The Central East Pacific (CEP) traffic flow contains air traffic between Mainland North America and Hawaii. The RASMAG/24 meeting designated this area as a hot spot (Hot Spot N) due to several reported occurrences and resulting increased risk estimates. The CEP is the busiest traffic flow within Oakland Oceanic Flight Information Region (FIR). This working paper will examine the traffic within the CEP and present the associated risk estimates for calendar year 2024.

## 2. DISCUSSION

Description of the CEP traffic flow

2.1 The CEP traffic flow contains air traffic operations traveling in the east and west directions between Mainland North America and Hawaii. Amongst the traffic flows observed within the Oakland Oceanic FIR, it is the busiest in terms of traffic volume. The average flight time for an aircraft within the CEP routes is four hours. The CEP has a fixed airway route system consisting of nine airways. The three most northern airways and the one most southern airway allow for bi-directional traffic. There are five one-way routes in the center of the route system. **Figure 1** shows the location of the CEP route system structure.

2.2 **Figure 2** provides some related statistics for observed air traffic within the CEP during calendar years 2019 through 2024. The data in Figure 2 show the traffic levels remain consistent and the proportion of flight operations utilizing data link for communication and surveillance continues to increase. The PARMO monitors the proportion of aircraft filing Required Communication Performance (RCP) 240, Required Surveillance Performance (RSP) 180, and Required Navigation Performance (RNP) 4. Aircraft filing all three indicators are eligible for performance-based reduced horizontal separation standards within Oakland Oceanic FIR. The data in Figure 2 show the proportion of flight operations eligible for reduced horizontal separation minima has substantially increased based on the observed filed flight plan RNP4 and PBCS capabilities. In 2019, only thirty one percent of CEP operations were filing RNP4 and PBCS, and in calendar year 2024 that percentage grew to more than seventy-seven.

2.3 **Figure 3** shows the observed number of flight operations by month from January 2020 through December 2024. The COVID-19 pandemic and the associated reduction in traffic levels is apparent during calendar year 2020 and in the beginning of calendar year 2021 in Figure 3.

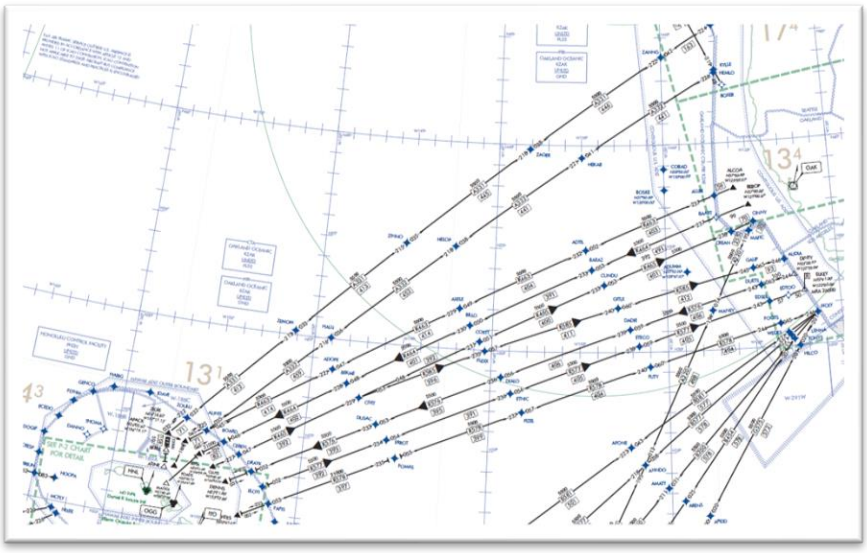

**Figure 1.** CEP route system

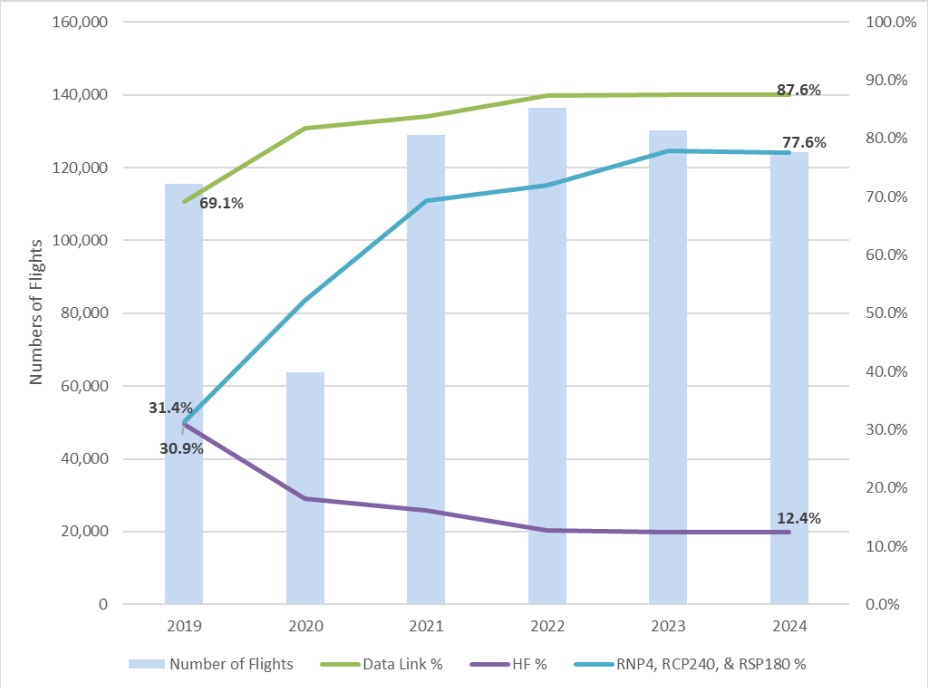


**Figure 2.** CEP Traffic Flow – 2019 through 2024

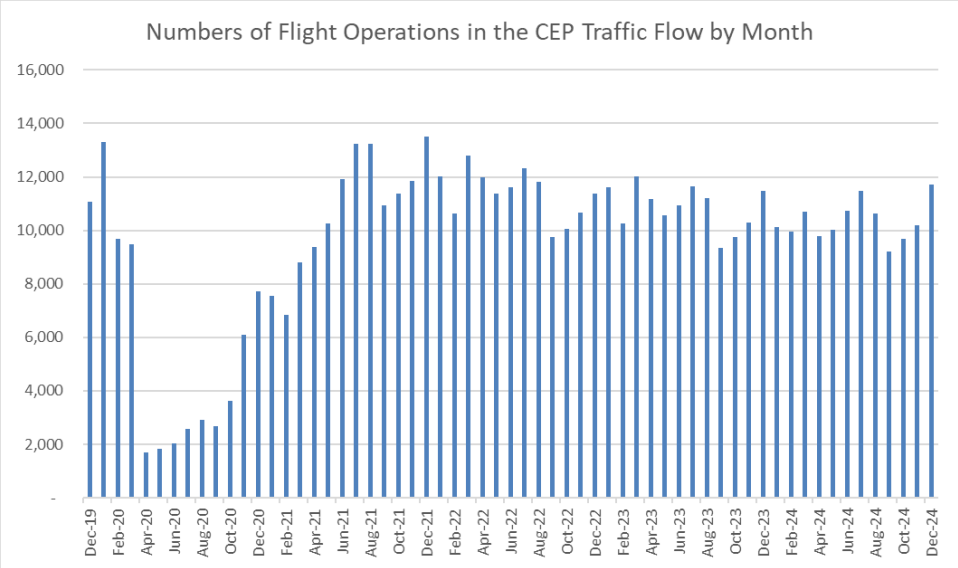


**Figure 3.** Observed number of flight operations in the CEP by month

Reported Large Height Deviations

2.4 In calendar year 2024, there were 40 reported LHDs that occurred within the CEP traffic flow. This is a slight increase over the 37 reported LHDs in calendar year 2023.

2.5 The reported occurrences were reviewed by the scrutiny group for U.S. Pacific Airspace. This scrutiny group consists of operational experts from each air traffic control facility, representatives from FAA Flight Standards and Airspace Safety, and safety analyses experts from the PARMO. The scrutiny group met virtually several times and reviewed all relevant reported occurrences from calendar year 2024.

2.6 **Figure 4** shows the durations associated with the reported LHDs has increased in 2024 from that reported in 2023. Starting with the reported occurrences received in calendar year 2020, there is accurate accounting of the durations associated with the reported occurrences involving ATC coordination between Honolulu Control Facility (HCF) and Oakland center. Figure 4 shows the durations associated with the reported LHDs in 2024 have increased by 92% from that reported in 2023.

2.7 **Table 1** provides the reported LHD by cause code, duration and flight levels crossed incorrectly for the CEP. The LHD category with the highest duration is category E, errors in ATC-to-ATC transfers. There are eight category B, 31 category E, and 1 category M reported LHDs. **Figure 5** shows the trends observed in reported LHD by cause code from 2018 – 2024.

2.8 There were 8 category B reported LHDs in calendar year 2024.

a) Three of these category B LHDs were marked as involving a weather deviation. One of these reports involved the pilot on an approved weather deviation that descended to a lower flight level without ATC clearance, in this report the aircraft crossed one flight level and operated at the unexpected altitude for 4 minutes.

b) Two of these category B LHDs were marked as involving an aircraft emergency. One report indicated 8 flight levels and the other indicated 3 flight levels were descended through without clearance. Both reports indicated the descend speed was rapid.

c) The remaining three category B reports were not assigned a sub-category.

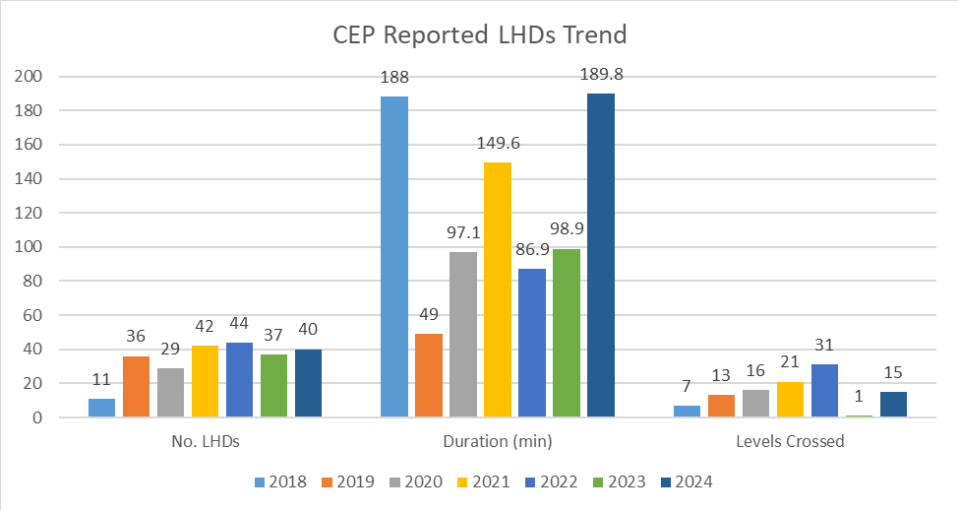


**Figure 4.** Reported LHDs Comparison Summary

**Table 1**. LHD report by category for CEP Traffic Flow - 2024

| LHD Category | LHD Category Description | No of LHD Occurrences | Duration (Min) | No. of FLs Levels Transitioned Without Clearance |
|---|---|---|---|---|
| B | Flight crew climbing /descending without ATC clearance; | 8 | 6 | 13 |
| E | Coordination errors in the ATC-unit-to-ATC-unit transfer of control responsibility as a result of human factors issues (e.g. late or non-existent coordination, incorrect time estimate/actual, flight level, ATS route etc not in accordance with agreed parameters); | 31 | 183.8 | 0 |
| M | Other *(pilot did not ACK the clearance)* | 1 | 0 | 2 |
| | **Totals** | **40** | **189.8** | **15** |

2.9 All 31 reported category E LHDs were errors in coordination from HCF to Oakland center. Using the new subcategories for Category E, all these occurrences have a subcategory E-RI, no revision in the ATC transfer information. There were 70 reported occurrences of this type within the CEP during calendar year 2024, however 39 of those occurrences were mitigated by ATC action and are not considered to be risk-bearing LHDs. The result of the ATC action was a corrected flight profile in the automation system prior to the aircraft entering oceanic airspace.

2.10 **Figure 6** shows the proportion of the Vertical Collision Risk Estime (CRE) by LHD category for the CEP traffic flow. The data show 92 percent of the Vertical CRE is related to the category E occurrences and 8 percent of the Vertical CRE is related to the category B occurrences.

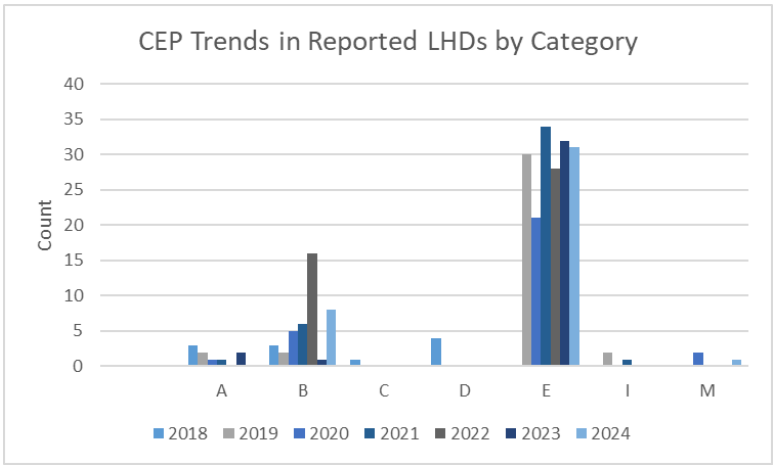


**Figure 5.** Observed Trends in Reported LHDs by Cause Code – 2018 through 2024

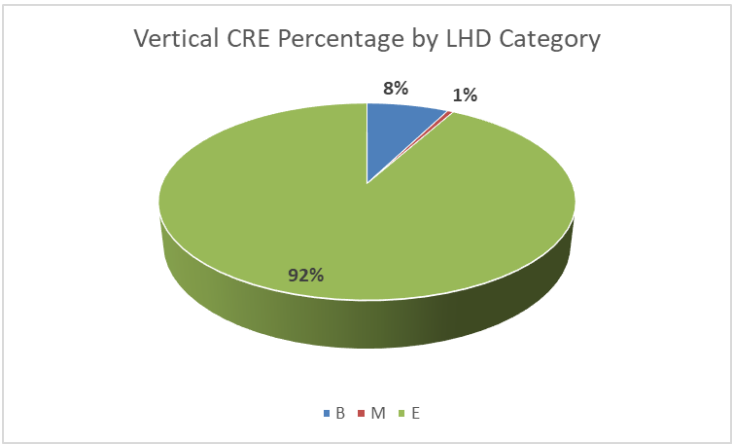


**Figure 6.** Percentage of Vertical CRE by LHD Category for the CEP Traffic Flow – 2024

2.11 **Figure 7** shows the locations of the reported LHDs within the CEP in 2024. The size of the circles in Figure 7 indicates the contribution towards the vertical collision risk estimate for calendar year 2024. The vertical collision risk estimates provided in Figure 7 considers whether the airway is unidirectional or bi-directional.

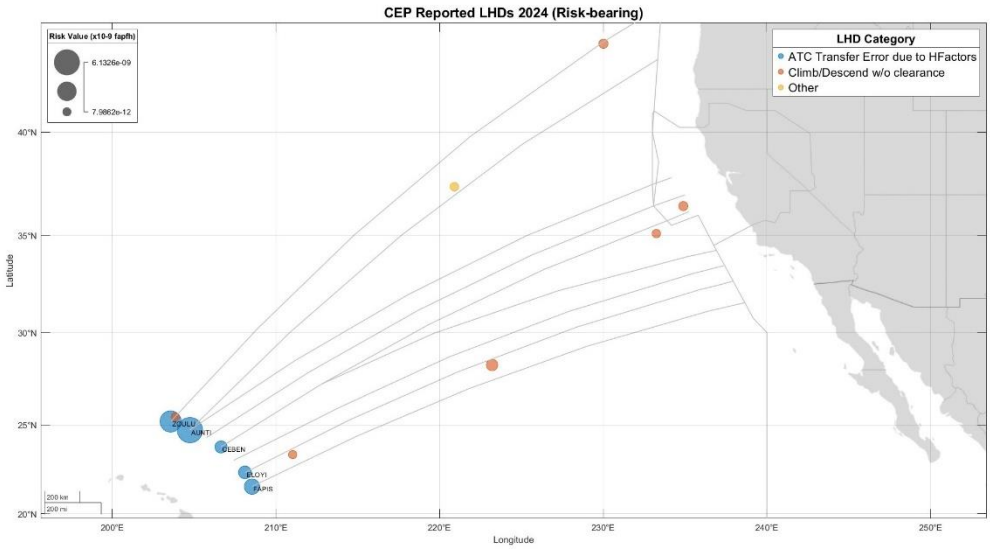

**Figure 7. Reported LHDs within the CEP Traffic Flow – 2024**

2.12 The trends in reported occurrences for the CEP in 2024 are consistent with that reported in 2023. The most frequently occurring category was errors in ATC-to-ATC transfers. There were 31 category E LHDs reported in the CEP in 2024, all involved transfers between HCF and Oakland center. The longest duration associated with one of these reported occurrences took place in January 2024 and had a duration of 17 minutes.

Category E LHD Reports

2.13 The total number of reported LHDs involving errors in transfers between HCF and Oakland center was forty-eight, not all of these occur within the CEP. **Figure 8** provides the general locations for all the category E LHD reports between HCF and Oakland center. The different colors indicate which traffic flow was affected by the reported occurrence, determined by the city pair. The reported LHD with locations to the east of Hawaii affect the Central East Pacific (CEP) traffic are colored in blue. The remaining traffic flows affected by these transfer errors include South Pacific (SOPAC), Japan-Hawaii, and OTHER traffic flows. The size of the circle at each boundary point represents the vertical collision risk estimate from all the reported category E LHDs at that location. The vertical risk estimates by traffic flow for the LHDs depicted in Figure 8 are shown in **Table 2.**

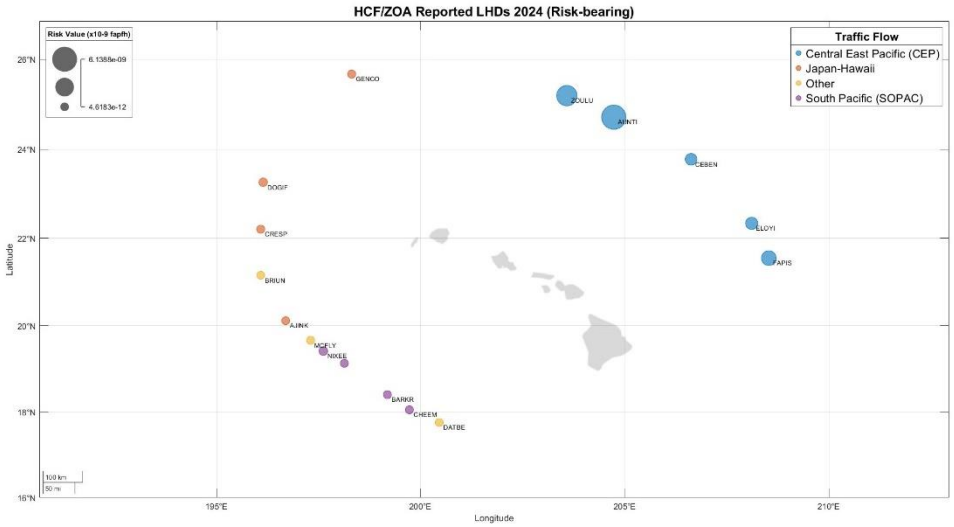


**Figure 8.** Reported LHDs transfer occurrences HCF – Oakland (2024)

**Table 2.** Vertical Risk Estimates by Traffic Flow - HCF/Oakland Category E LHD Reports 2024

| Traffic Flow | LHD Count | LHD Duration Sum (min) | Sum Vertical Risk Estimate ($\times 10^{-9}$ fapfh) |
|---|---|---|---|
| **CEP** | 31 | 183.8 | 13.8 |
| **Japan-Hawaii** | 5 | 32.6 | 0.2 |
| **OTHER** | 4 | 10.7 | 0.07 |
| **SOPAC** | 8 | 40.3 | 0.3 |

2.14 The scrutiny review group informed PARMO these occurrences affect the user preferred routes (UPRs) crossing fixed airways within Oakland Oceanic FIR. These events occur frequently and require significant resources at the ATC facility to investigate underlying causes.

2.15 The available system data were examined for all the LHD category E occurrences involving HCF and Oakland center. The operational experts from Oakland center determined whether there was any unprotected time within Oakland Oceanic FIR for each occurrence. First, the actual boundary crossing time was noted. Next, the time stamp for an update to the aircraft profile in the Oakland automation system was noted. If the aircraft profile was updated prior to the boundary crossing, the occurrence is considered a reported prevention and has zero duration. If the aircraft profile was updated after the boundary crossing, the occurrence has a non-zero duration and unprotected time within Oakland Oceanic FIR.

2.16 A task force was established to further investigate these occurrences and determine remedial actions, the task force met at the HCF early in 2021. The task force reviewed the current systems and procedures at the HCF. It was determined that the HCF does not have the functionality to update the aircraft profile and transfer the updated information to the next facility. The current automation system includes the Surveillance Data Processing (SDP) Microprocessor En Route Automated Radar Tracking System (Micro-EARTS) and the Offshore Flight Data Processing System (OFDPS). The FAA's offshore modernization plan had been delayed for many years due to higher priorities. The current plan to implement the En Route Automation Modernization (ERAM) system at the HCF is planned for implementation by the end of 2025. Prior to that time, both facilities have implemented mitigation strategies:

2.17 A procedure that requires the controller to determine the remaining travel time to the boundary fix is in use by the HCF. During this procedure, ATC computes an estimated time of arrival (ETA) for the boundary fix and manually transfers the ETA to the next facility. It is noted that this is a manual procedure and a short-term solution.

2.18 Oakland center has implemented refresher training for the oceanic controllers. This training instructs the controllers on how to update an aircraft's profile/fix times using the coordination window within the ATC automation system. All the reported occurrences of this type were validated by Oakland center using the radar information or ADS-C position information from the aircraft.

2.19 Furthermore, the FAA's Air Traffic Safety Oversight Service is providing oversight of the development and implementation of additional mitigations aimed at reducing the vertical risk estimate in the CEP prior to ERAM implementation. **Figure 9** shows the current observed trends, many of the occurrences are mitigated prior to the time the aircraft reaches the oceanic entry point.

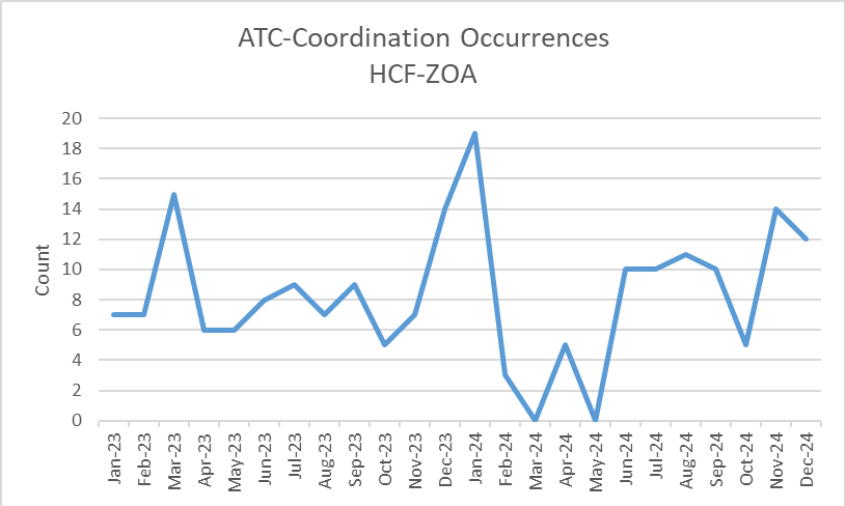


**Figure 9.** Observed Trends in ATC-Coordination Occurrences, HCF-ZOA

Vertical Risk Estimate

2.20 The methodology used to estimate vertical risk in Pacific airspace considers the location of the reported LHDs. The vertical risk estimates for each traffic flow are calculated and then weighted by the observed flying hours within each flow. Therefore, the individual vertical risk for the CEP traffic flow is available through the vertical risk calculations for Pacific airspace**.**

2.21 The overall vertical risk for the CEP in 2024 is 15.1 × $10^{-9}$ fapfh, a value that exceeds the target level of safety (TLS). This value represents a slight increase from that reported in 2023. **Figure 10** shows the two-year (rolling 12-month) trend for the CEP vertical collision risk estimates.

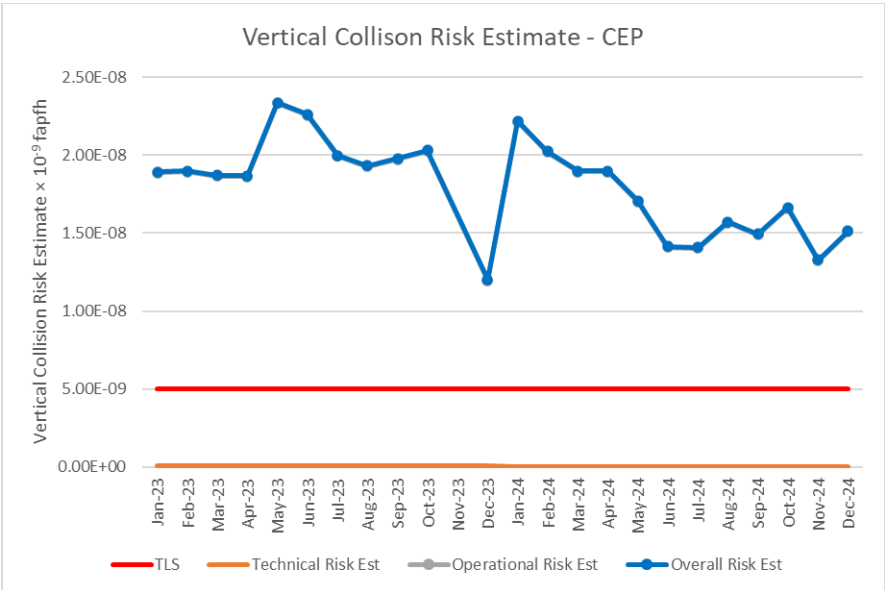


**Figure 10.** CEP vertical collision risk estimates by calendar year (rolling 12-month)

Hot Spot Identification Process

2.22 This section updates the Hot Spot Identification criteria for Hot Spot N. This process was proposed at Ninth Meeting of the RASMAG Monitoring Agencies Working Group (RASMAG/MAWG/9) in February 2022. **Table 3** provides the results of the Hot Spot identification process applied to the CEP Traffic Flow, Hot Spot N.

**Table 3**: Hot Spot N Results

| | **2018** | **2019** | **2020** | **2021** | **2022** | **2023** | **2024** |
|---|---|---|---|---|---|---|---|
| Number of LHDs in Hot Spot N | 11 | 36 | 29 | 42 | 44 | 37 | 40 |
| Number of Clusters (n) in Region | 4 | 3 | 3 | 3 | 3 | 3 | 3 |
| Hot Spot N Operational Risk ($\times 10^{-9}$ fapfh) | 23.7 | 16.4 | 17.3 | 23.7 | 21.2 | 12.0 | 15.1 |
| Criteria: Number of Occurrences in Region/(n+1) | 6.4 | 20.75 | 12.85 | 16.25 | 17.5 | 9.25 | 10 |
| Criteria: Region Risk Estimate ($\times 10^{-9}$ fapfh)/(n+1) | 5.28 | 7.85 | 5.5 | 7.05 | 8.15 | 3 | 3.8 |
| Criteria: TLS >= 5 $\times 10^{-9}$ fapfh | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| **Result and Action by RASMAG Meeting** | Continue Monitoring (RASMAG/24) | Continue Monitoring (RASMAG/25) | Continue Monitoring (RASMAG/26) | Continue Monitoring (RASMAG/27) | Continue Monitoring (RASMAG/28) | Continue Monitoring (RASMAG/29) | Continue Monitoring (RASMAG/30) |

2.23 The results shown in Table 3 confirm the decision to continue monitoring the data collected for Hot Spot N. PARMO will provide an update for Hot Spot N to RASMAG/31 in 2026.

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) review the hot spot criteria for this area; and

c) discuss any relevant matters as appropriate.

— END —