

# Local vs Regional Stability of Gulf of Alaska Groundfish Assemblages

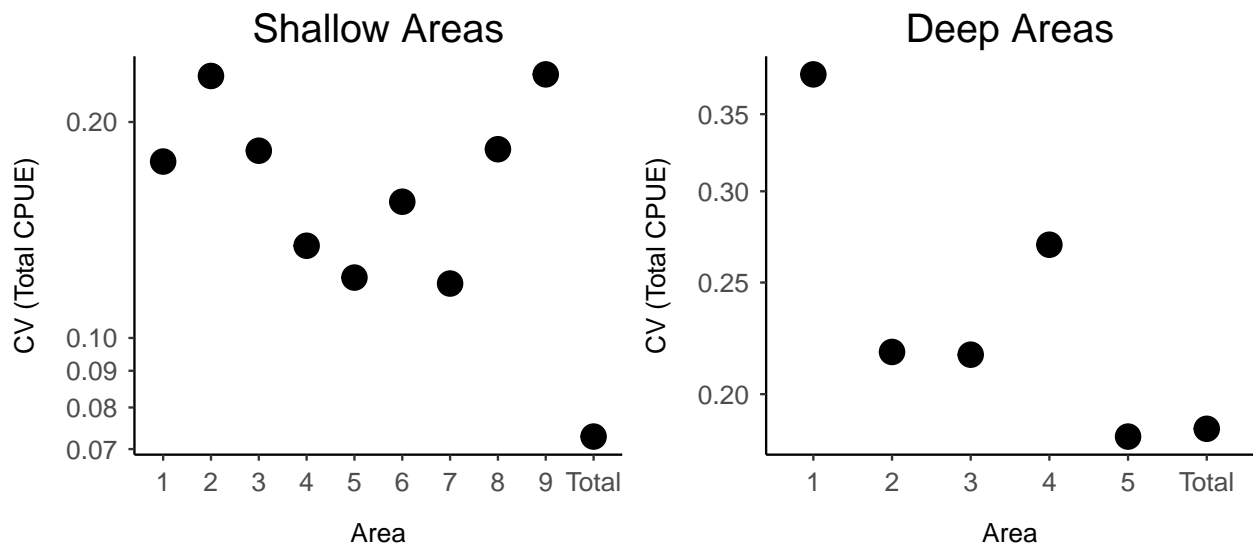
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To address local vs regional community stability we can compare CVs of total CPUE between local communities and the regional metacommunity. The regional community does indeed show greater stability than local communities. Note that y-axis scales differ - deep areas are generally less stable than shallow areas.

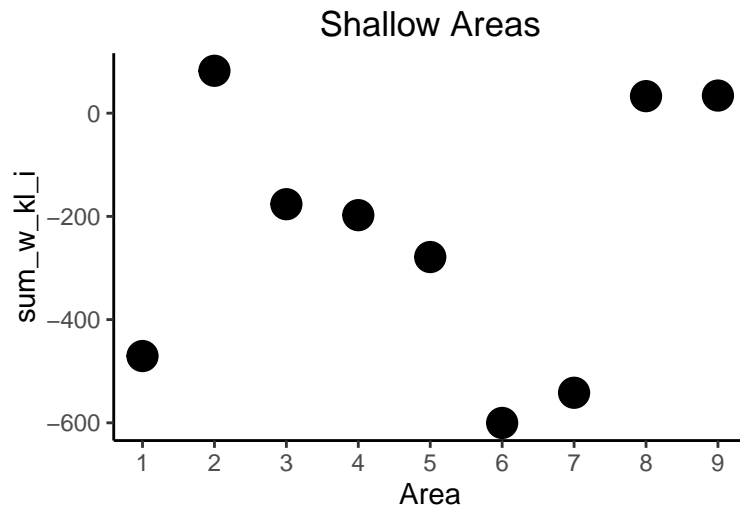
**The magnitude of the portfolio effect can be assessed from the ratio of mean local CV / regional CV (ie the increase in stability that arises from spatial (beta) diversity; values  $>1$  indicate a stabilizing effect): the ratio is  $\sim 2.3$  for shallow areas and  $\sim 1.4$  for deep areas.** (I'm not sure the difference between effect size in shallow and deep is meaningful, it may arise because we have more local patches for shallow areas.)

[If anyone wants to make these plots prettier, please do :) ]



Although we can compare local and regional community stability using CVs alone, here we calculate metrics from Wang & Loreau (2014) to help us think about mechanisms underlying this result. The following uses formulas from Wang & Loreau's (2014) Supp Mat (i.e. for the case where biomass varies within and between local communities).

Within-patch sums of all between-species covariances. Negative values indicate asynchrony.



Alpha variability (temporal variability at the local scale (NB weighed for local community biomass)):

```
alpha_CV
```

```
## [1] 2.381262e-05
```

Spatial synchrony:

```
rho
```

```
## [1] 0.05382087
```

Within-patch variance (ie temporal variance of each local area's total community CPUE, within local communities):

```
w_ii
```

```
##      1      2      3      4      5      6      7
## 891.8923 2054.0599 1539.9616 670.8351 685.6405 1127.1972 768.8339
##      8      9
## 263.1764 491.0984
```

Temporal covariance of total community CPUE between all pairs of local communities. Broadly speaking, local areas 1-6 covary positively with eachother, as do areas 7-9. Areas 1-6 covary negatively with 7-9.

```
w_ih
```

```
##          1          2          3          4          5          6
## 1          NA          NA          NA          NA          NA          NA
## 2 309.209103          NA          NA          NA          NA          NA
## 3 117.961250 1429.1621          NA          NA          NA          NA
## 4  90.749470  688.5154  809.4112          NA          NA          NA
## 5  83.801084  442.6064  414.1589  556.358402          NA          NA
## 6  -7.617087  147.4603  185.1100  284.590775  338.27879          NA
## 7  -3.884077 -134.0792 -182.4749  -3.223966  -59.77203  55.98737
## 8 232.201796 -139.0428 -219.6005 -267.571409 -282.66585 -239.02338
## 9 303.177440 -267.5692 -401.1155 -405.325488 -355.48290 -190.62833
##          7          8  9
## 1          NA          NA NA
## 2          NA          NA NA
## 3          NA          NA NA
## 4          NA          NA NA
## 5          NA          NA NA
## 6          NA          NA NA
## 7          NA          NA NA
## 8 80.23373          NA NA
## 9 62.98145 340.9695 NA
```

Beta variability (Multiplicative beta variability, i.e. the degree of spatial asynchrony):

```
Beta1
```

```
## [1] 18.58015
```

Gamma variability (temporal variability at the metacommunity scale):

```
gamma_CV
```

```
## [1] 1.281616e-06
```