# NCRMP Hawaiian Islands Report Card: Benthic Indicators

# Benthic indicators:  Hawaiian Islands

**GOAL:  Include a limited number of metrics that provide stable indicators of coral population and benthic community status.**

**Benthic communities – benthic cover**
- Coral
- CCA
- Macroalgae

**Coral populations**
- Juvenile density
- Adult density
- Partial mortality – old dead

# Benthic StRS surveys Hawaiian Islands

| | MHI | | | | NWHI | |
| Island | n (2013) | n (2016) | | Island | n (2014-2015) | n (2016) |
|---|---|---|---|---|---|---|
| HAW | 24 | 31 | | FFS | 16 | 26 |
| KAH | NS | 11 | | KUR | 6 | 19 |
| KAU | 14 | 17 | | LAY | 5 | NS |
| LAN | 14 | 15 | | LIS | 21 | 16 |
| MAI | 8 | 15 | | MAR | 10 | NS |
| MOL | 21 | 11 | | MID | 19 | NS |
| NII | 17 | 5 | | PHR | 14 | 20 |
| OAH | 32 | 32 | | | | |

What survey years should be included in the report card for MHI and NWHI?

# Benthic indicators:  Hawaiian Islands

- Report card groups:
  - NWHI (all)
  - Oahu
  - Big Island
  - Kauai/Niihau
  - Maui Nui
    - Maui, Lanai, Molokai, Kahoolawe

# Benthic indicators:  Coral populations

## Taxa included:

-  Need to generate a select list of abundant and important coral species and genera across jurisdiction


- Provides information about existing coral populations and incorporates a mechanism to determine about how coral populations are changing over time (fluctuations in one or more of the selected taxon)

# Benthic indicators: Coral populations MHI 2016

| taxon group | taxon name | taxon code | taxon group rank |
|---|---|---|---|
| genus | Montipora | MOSP | 1 |
| genus | Porites | POSP | 2 |
| genus | Pocillopora | POCS | 3 |
| genus | Pavona | PAVS | 4 |
| genus | Psammocora | PSSP | 5 |
| genus | Leptastrea | LEPT | 6 |
| genus | Cyphastrea | CYPS | 7 |
| genus | Leptoseris | LESP | 8 |
| genus | Fungia | FUSP | 9 |
| species | Porites lobata | PLOB | 1 |
| species | Montipora capitata | MCAP | 2 |
| species | Montipora patula | MPAT | 3 |
| species | Porites compressa | PCOM | 4 |
| species | Pocillopora meandrina | PMEA | 5 |
| species | Porites lichen | PLIC | 6 |
| species | Pavona varian | PVAR | 7 |
| species | Montipora flabellata | MFLA | 8 |
| species | Porites lutea | PLUT | 9 |
| species | Porites duerdeni | PODU | 10 |
| species | Pavona duerdeni | PDUE | 11 |
| species | Porites brighami | PBRI | 12 |
| species | Psammora stellata | PSTE | 13 |
| species | Leptastrea bewickensis | LBEW | 14 |
| species | Montipora incrassata | MINC | 15 |
| species | Pocillopora eydouxi | PEYD | 16 |
| species | Pavona maldivensis | PMAL | 17 |
| species | Leptastrea purpurea | LPUR | 18 |
| species | Psammocora haimeana | PHAI | 19 |
| species | Porites monticulosa | PMON | 20 |

# Benthic indicators: Coral populations NWHI 2014-2015

| taxon group | taxon name | taxon code | taxon group rank |
|---|---|---|---|
| genus | Porites | POSP | 1 |
| genus | Montipora | MOSP | 2 |
| genus | Pocillopora | POCS | 3 |
| genus | Acropora | ACSP | 4 |
| genus | Cyphastrea | CYPS | 5 |
| genus | Pavona | PAVS | 6 |
| genus | Psammocora | PSSP | 7 |
| genus | Fungia | FUSP | 8 |
| genus | Leptastrea | LEPT | 9 |
| genus | Leptoseris | LESP | 10 |
| genus | Cycloseris | CYSP | 11 |
| species | Montipora capitata | MCAP | 1 |
| species | Porites compressa | PCOM | 2 |
| species | Porites lobata | PLOB | 3 |
| species | Montipora patula | MPAT | 4 |
| species | Porites lutea | PLUT | 5 |
| species | Cyphastrea ocellina | COCE | 6 |
| species | Acropora cytherea | ACYT | 7 |
| species | Porites lichen | PLIC | 8 |
| species | Pocillopora ligulata | PLIG | 9 |
| species | Pavona duerdeni | PDUE | 10 |
| species | Pocillopora meandrina | PMEA | 11 |
| species | Porites evermanni | PEVE | 12 |
| species | Psammora stellata | PSTE | 13 |
| species | Montipora flabellata | MFLA | 14 |
| species | Porites duerdeni | PODU | 15 |
| species | Fungia scutaria | FSCU | 16 |
| species | Porites brighami | PBRI | 17 |
| species | Pocillopora damicornis | PDAM | 18 |
| species | Porites solida | PSOL | 19 |
| species | Acropora paniculata | APAN | 20 |

# Benthic indicator :  Juvenile density

**Description:**  Weighted mean density of juvenile coral colonies (< 5 cm) for each island as the number of colonies per m$^2$. (Selected taxa)

**Rationale:**  Provides additional information about the potential outlook for these coral populations – "Are there babies on the reef that will potentially grow to adults?"

# Benthic indicator :  Adult density

**Description:**  Weighted mean density of adult coral colonies (≥ 5 cm) for each island or sector of island as the number of colonies per m$^2$. (Selected taxa)

**Rationale:**  Provides an abundance metric of reproductive colonies in the selected taxa group.

# Benthic indicator :  Partial mortality

**Description:  Weighted** mean proportion of old dead partial mortality for adult coral colonies (selected taxa) – estimated for each island.

**Rationale:**  Provides a metric of cumulative partial mortality in the selected taxa group and may be a proxy for loss of reproductive biomass.

# Benthic indicators:  Next steps

- What genera and species to use? –  common across island range or island-specific?


- Thresholds – use existing time series to set thresholds, the range of values from the survey (e.g. American Samoa), or Pacific-wide range?


- For islands with multiple reef zones, should we include all reef zone or fore reef only?