Q: What is the level of agreement on phenophase intensity between multiple observers?

**Intensity = NA, not appropriate for this analysis**

Assumptions:

* >1 observation made/phenophase on a single individual on the same day by >1 observer
  + Duplicate records from the same observer omitted
* Within each comparison, all observers have the same, self-reported skill level
* Only Phenophase Status = Yes records included
* Only Phenophases for which an intensity is required are included (falling leaves and pollen release excluded from analysis)
* Data downloaded from USA-NPN 20150604 according to the following search parameters:
  + Parameter,Setting,
  + Start Date:,2005-01-01,
  + End Date:,2015-07-15,
  + Quality Flags:,ignored,
  + Phenophase Category:,"Leaves,Flowers,Needles,Pollen cones",

88.2% of all comparisons (n=764) agreed on intensity value.

Table 1. Proportion of observations with multiple observers that agree on phenophase intensity without consideration of phenophase being observed. Level of agreement between observers does not differ between Beginner and Intermediate groups (p=0.09)

|  |  |  |
| --- | --- | --- |
| **skillLevel** | **n** | **propAgree** |
| Beginner | 412 | 0.86 |
| Intermediate | 352 | 0.90 |

Table 2. Level of agreement varies by the functional type being observed (p<0.001) this affect is the same if the Semi-deciduous broadleaf functional type is removed from the analysis.

|  |  |  |
| --- | --- | --- |
| **functionalType** | **n** | **propAgree** |
| Deciduous broadleaf | 533 | 0.86 |
| Evergreen broadleaf | 172 | 0.99 |
| Forb | 45 | 1.00 |
| Semi-deciduous broadleaf | 14 | 0.14 |

Table 3. Proportion of observations with multiple observers that agree on phenophase intensity without consideration of skill. Level of agreement between observers ranges from 32-100% and differs significantly by phenophase observed (p<0.001).

|  |  |  |
| --- | --- | --- |
| **phenophaseName** | **n** | **propAgree** |
| Breaking leaf buds | 163 | 0.96 |
| Colored leaves | 50 | 0.32 |
| Flowers or flower buds | 106 | 0.96 |
| Increasing leaf size | 96 | 0.88 |
| Leaves | 216 | 0.88 |
| Open flowers | 90 | 1.00 |
| Young leaves | 43 | 0.81 |

Table 4. The level of agreement on intensity level for specific phenophases differs by skillLevel (p<0.001).

|  |  |  |  |
| --- | --- | --- | --- |
| **skillLevel** | **phenophaseName** | **n** | **propAgree** |
| Beginner | Breaking leaf buds | 87 | 1.00 |
| Beginner | Colored leaves | 36 | 0.22 |
| Beginner | Flowers or flower buds | 46 | 1.00 |
| Beginner | Increasing leaf size | 56 | 0.93 |
| Beginner | Leaves | 115 | 0.84 |
| Beginner | Open flowers | 44 | 1.00 |
| Beginner | Young leaves | 28 | 0.79 |
| Intermediate | Breaking leaf buds | 76 | 0.92 |
| Intermediate | Colored leaves | 14 | 0.57 |
| Intermediate | Flowers or flower buds | 60 | 0.93 |
| Intermediate | Increasing leaf size | 40 | 0.80 |
| Intermediate | Leaves | 101 | 0.92 |
| Intermediate | Open flowers | 46 | 1.00 |
| Intermediate | Young leaves | 15 | 0.87 |

**Analysis 2, ignoring observer skill level**

Assumptions:

* >1 observation/phenophase made on a single individual on the same day by >1 observers
  + Duplicate records from the same observer omitted
* Only Phenophase Status = Yes records included
* Only Phenophases for which an intensity is required are included (falling leaves and pollen release excluded from analysis)
* Only **non-null** values for phenophase intensity considered
* Data downloaded from USA-NPN 20150715 according to the following search parameters:
  + n=2,936,873 records
  + Parameter,Setting,
  + Start Date:,2005-01-01,
  + End Date:,2015-07-15,
  + Phenophase Category:,"Leaves,Flowers,Needles,Pollen cones",

6,437 qualifying duplicates

Total agreement = %75.6

**By Phenophase**

|  |  |  |  |
| --- | --- | --- | --- |
| **phenophaseName** | **sumAgree** | **instances** | **propAgree** |
| Breaking leaf buds | 547.00 | 680 | 0.80 |
| Colored leaves | 534.00 | 743 | 0.72 |
| Emerging needles | 128.00 | 152 | 0.84 |
| Increasing leaf size | 754.00 | 873 | 0.86 |
| Leaves | 1581.00 | 2170 | 0.73 |
| Open flowers | 569.00 | 777 | 0.73 |
| Young leaves | 612.00 | 875 | 0.70 |
| Young needles | 133.00 | 167 | 0.80 |

**By Growth Form**

|  |  |  |  |
| --- | --- | --- | --- |
| **functionalType** | **sumAgree** | **instances** | **propAgree** |
| Cactus | 2.00 | 7 | 0.29 |
| Deciduous broadleaf | 3464.00 | 4255 | 0.81 |
| Evergreen broadleaf | 892.00 | 1219 | 0.73 |
| Evergreen conifer | 261.00 | 319 | 0.82 |
| Forb | 8.00 | 16 | 0.50 |
| Graminoid | 0.00 | 1 | 0.00 |
| Semi-deciduous broadleaf | 231.00 | 620 | 0.37 |

**Proportion that agree within 1 bin**

%91.26