Priority 1: Prairie Synthesis Report

Contact: Dr. Regina Rochefort

The NCCN Prairie Vegetation Monitoring Vital sign documents trends in physiognomic cover classes and prairie quality at San Juan Island National Historic Park (SAJH). Monitoring has been conducted for 6 years (2008-2009, 2012-2015), database development is nearing completion, and data quality reviews (spatial and quantitative) will be completed in the fall of 2015. Quick data summaries (i.e., not rigorous statistical analysis) have been used over the last two years for briefings to park managers and for use in management plans, but a comprehensive analysis and summary of data have not yet been conducted. We are proposing to work with Shay Howlin to write a synthesis report of on status and trends landscape cover (i.e., physiognomic) and prairie quality. We will also provide recommendations on the future implementation of this protocol. Shay was the statistician who worked with the NCCN and R. Rochefort to develop the protocol, including design of sampling methods and data analysis.

* Analysis of six years of data and collaboration in summary report (NPS publication).
* Review of monitoring methodology; collaborate in recommendations of revisions to current protocol.
* Collaboration in writing of a manuscript for submission to a peer review journal.
* Provide R code for future analysis based on the recommendations for revisions to the monitoring and analysis methods.

We have flexibility, but anticipate the following timeline:

November – February: Periodically available for consulting

March: Review status and trend report

April: Review revised SOPs and R code

Shay Howlin is a Research Biometrician V with an hourly rate of $123.43.

Priority 2: Whitebark Pine Status and Trends

Contact: Dr. Regina Rochefort

The NCCN established a whitebark pine monitoring program in 2004; sites in NOCA and MORA were monitored in 2004 and 2009. This year, NOCA received $10,000 from the USFS to resurvey the plots in both parks. In 2009, Shay Howlin worked with Regina Rochefort to analyze data from 200 and 2009 to describe status and trends in blister rust infection and mortality in whitebark pine stands. These data were presented at the Ecological Society of America meeting in Portland in 2012. We are requesting funding to analyze whitebark pine status and trends following data collection in 2015, written summaries of analysis methods and results, and development (co-authorship) of a manuscript for submission to a peer review journal such as Antarctic, Arctic, and Alpine Research or Canadian Journal of Forest Research.

Shay Howlin is a Research Biometrician V with an hourly rate of $123.43.

June 7, 2016 Update

Based on phone call between Shay Howlin, Leigh Ann Stracevich, Regina Rochefort, John Boetsch, and input from Natasha Antonova

**Status of Data for each Project and updates on conversation on goals**

**Data Delivery to West from NPS**

* Overall for both projects we reviewed that the goal is to have all data to West by June 30.
* Is there any lee way on this? For example 3 missing trees at MORA, that the crew could look for on July 6.

**Whitebark Pine Status and Trends**

***Data Status***

* At MORA, all plots have been monitored 3 times – 2004, 2009, 2015 – but 3 trees are “missing” in 2015 from one plot with few individuals
* At NOCA, 2 polygons have not been surveyed (see below)

**Table summarizing polygon names and field survey status**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Polygon/site** | **Code** | **Formerly called** | **Number of plots** | **Status** |
| MORA |  |  |  |  |
| Antler Peak | AP |  | 4 | 3 trees missing in 2015 |
| Crystal Ridge | CR | Crystal Creek CC | 5 | Complete1 |
| Fryingpan | FP |  | 3 | Complete1 |
| Glacier Basin | GL | The Wedge TW | 5 | Complete1 |
| Mystic Lake | ML |  | 3 | Complete1 |
| Skyscraper | SS | Berkeley Park BP | 2 | Complete1 |
| Sunrise Campground | SG | Frozen Lake FL, Shadow Lake SL | 5 | Complete1 |
| The Palisades | PA |  | 2 |  |
| NOCA |  |  |  |  |
| Dee Dee Lake | DD |  | 7 | 1 plot has unmeasured trees |
| Juanita Lake | JL | Triplet Lake (TL), Splawn Mtn | 7 | Complete1 |
| Rainbow Lakes | RL |  | 7 | Survey 2016 |
| Rainbow Ridge | RR |  | 7 | Complete1 |
| Stiletto | ST |  | 7 | Survey 2016 |

1Complete means monitored in 2004, 2009, and 2015

***Monitoring & Analysis Goals/Objectives***

Basically to repeat the analysis we did for ESA in 2012:

*Status and Trends*

* Describe status and trends in dead, infected, & healthy (seemingly) trees
* Describe status and trends in infected and healthy saplings
* Describe status and trends in numbers of seedlings
* Mountain pine beetle

*Landscape patterns in trees with respect to*:

* Elevation (mortality and infection)
* West to east
* Slope and aspect
* Prevalence

***Report and Focus of Analysis***

* Based on the status of the data QA/QC and incomplete surveys (for NOCA) we decided to focus on MORA
* Analysis will concentrate on MORA so the model can provide a detailed park-based analysis of patterns which will allow for NPS to develop more detailed management plans or recommendations for monitoring
* We will still continue in 2016 (finding some funds) for NOCA analysis
* We intend to do a larger landscape analysis of both parks or comparing parks after individual analysis/models
* Report should be prepared in much the same manner as prairies in that the goal is a summary report, not an NPS series publication, but text, analysis, ideas that can be used in a joint publication in a peer reviewed journal (we do need to agree on authorship prior to going forward – minimum is Rochefort & Howlin, probably also Boetsch, …)
* Report should include:
  + Statistical analysis
  + Results
  + R code
  + Recommendation for revisions to survey methods based on problems noticed in data

**Prairie Synthesis Report**

***Data Status***

* All transect details has been migrated from a GIS shapefile and data table into the “official” NPS database. Details means coordinates of each segment with the descriptors (physiognomic type, vegetation origin, browse or substrate).
* Header data: observers, dates, weather still need to be entered
* Data need validation and verification (i.e. QA/QC), but this should be short quick because data has been checked quite a bit by Natasha or Gina

*Summary of Transects by Year*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Transect Type | Panels Completed Each Year1 | | | | | |
| 2008 | 2009 | 2012 | 2013 | 20144 | 2015 |
| 2015 |  |  |  |  |  |  |
| Rotating Panel |  |  |  |  |  |  |
| *Rotating panel #* | 3 | 32,4 | 5 | 6 | 2 | 3 |
| *Missed annual transects* | 0 | 0 | 0 | 0 | 43 | 0 |
| *Missed rotating transects* | 0 | 0 | 0 | 0 | 0 | 0 |

1Out of a total of 20 annual (panel 1) and 5 rotating (panel 2-6)

2Transects 3-2 and 3-5 were surveyed again in 2009

3Transects 1-6,1-12,1-15 and 1-18 were not surveyed in 2014

4 North ends of transects 3-2,3-5,4-2,4-3 and 6-5 were also surveyed in 2014

Natasha – can you add a table of all the transect lengths? Maybe it would be good to have the coordinates north and south. I have one for 2015 but I don’t know if I have a summary of all transects. You can add a separate document or however you want.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Transect | Panel\_type | UTM E NAD83 | UTM N NAD83 | Start\_End | Source | Length\_m |
| AC.1-1 | Annual | 497813 | 5368643 | End | GRTS |  |
| AC.1-1 | Annual | 497813 | 5368084 | Start | GRTS | 559.17 |
| AC.1-2 | Annual | 498741 | 5368643 | End | GRTS |  |
| AC.1-2 | Annual | 498741 | 5367241 | Start | 2012 | 1401.91 |
| AC.1-3 | Annual | 500520 | 5367852 | End | GRTS |  |
| AC.1-3 | Annual | 500520 | 5366892 | Start | 2014 | 959.99 |
| AC.1-4 | Annual | 498262 | 5368643 | End | GRTS |  |
| AC.1-4 | Annual | 498262 | 5367324 | Start | 2013 | 1318.56 |
| AC.1-5 | Annual | 500266 | 5367995 | End | GRTS |  |
| AC.1-5 | Annual | 500266 | 5366900 | Start | GRTS | 1095.09 |
| AC.1-6 | Annual | 498137 | 5368643 | End | GRTS |  |
| AC.1-6 | Annual | 498137 | 5367384 | Start | 2012 | 1259.04 |
| AC.1-7 | Annual | 499732 | 5368369 | End | 2013 |  |
| AC.1-7 | Annual | 499732 | 5366991 | Start | 2015 | 1377.48 |
| AC.1-8 | Annual | 500972 | 5367660 | End | 2014 |  |
| AC.1-8 | Annual | 500972 | 5366886 | Start | 2009 | 773.99 |
| AC.1-9 | Annual | 498860 | 5368643 | End | GRTS |  |
| AC.1-9 | Annual | 498860 | 5367133 | Start | 2012 | 1509.66 |
| AC.1-10 | Annual | 499928 | 5368213 | End | 2014 |  |
| AC.1-10 | Annual | 499928 | 5366957 | Start | GRTS | 1255.89 |
| AC.1-11 | Annual | 501701 | 5367630 | End | 2015 |  |
| AC.1-11 | Annual | 501701 | 5366813 | Start | 2008 | 816.49 |
| AC.1-12 | Annual | 498255 | 5368643 | End | GRTS |  |
| AC.1-12 | Annual | 498255 | 5367329 | Start | 2012 | 1314.13 |
| AC.1-13 | Annual | 499341 | 5368643 | End | GRTS |  |
| AC.1-13 | Annual | 499341 | 5367020 | Start | 2015 | 1622.86 |
| AC.1-14 | Annual | 500795 | 5367711 | End | GRTS |  |
| AC.1-14 | Annual | 500795 | 5366930 | Start | 2013 | 780.54 |
| AC.1-15 | Annual | 498615 | 5368643 | End | GRTS |  |
| AC.1-15 | Annual | 498615 | 5367195 | Start | 2012 | 1447.6 |
| AC.1-16 | Annual | 499908 | 5368223 | End | 2015 |  |
| AC.1-16 | Annual | 499908 | 5366960 | Start | GRTS | 1262.93 |
| AC.1-17 | Annual | 501520 | 5367715 | End | 2012 |  |
| AC.1-17 | Annual | 501520 | 5366826 | Start | 2008 | 889.62 |
| AC.1-18 | Annual | 497924 | 5368643 | End | GRTS |  |
| AC.1-18 | Annual | 497924 | 5367406 | Start | 2012 | 1236.67 |
| AC.1-19 | Annual | 499705 | 5368394 | End | 2015 |  |
| AC.1-19 | Annual | 499705 | 5366996 | Start | 2015 | 1397.8 |
| AC.1-20 | Annual | 501305 | 5367690 | End | GRTS |  |
| AC.1-20 | Annual | 501305 | 5366843 | Start | 2009 | 846.89 |
| AC.2-1 | Rotating Year 1 | 501194 | 5367610 | End | GRTS |  |
| AC.2-1 | Rotating Year 1 | 501194 | 5366850 | Start | 2007 | 760.05 |
| AC.2-2 | Rotating Year 1 | 498317 | 5368643 | End | GRTS |  |
| AC.2-2 | Rotating Year 1 | 498317 | 5367132 | Start | 2014 | 1510.53 |
| AC.2-3 | Rotating Year 1 | 499433 | 5368643 | End | GRTS |  |
| AC.2-3 | Rotating Year 1 | 499433 | 5367088 | Start | 2007 | 1555.47 |
| AC.2-4 | Rotating Year 1 | 501083 | 5367622 | End | GRTS |  |
| AC.2-4 | Rotating Year 1 | 501083 | 5366866 | Start | 2007 | 756.9 |
| AC.2-5 | Rotating Year 1 | 498869 | 5368643 | End | GRTS |  |
| AC.2-5 | Rotating Year 1 | 498869 | 5367130 | Start | 2007 | 1512.84 |
| AC.3-1 | Rotating Year 2 | 499831 | 5368280 | End | 2015 |  |
| AC.3-1 | Rotating Year 2 | 499831 | 5366972 | Start | GRTS | 1307.93 |
| AC.3-2 | Rotating Year 2 | 501612 | 5367657 | End | 2015 |  |
| AC.3-2 | Rotating Year 2 | 501612 | 5366822 | Start | 2015 | 835.17 |
| AC.3-3 | Rotating Year 2 | 497799 | 5368643 | End | GRTS |  |
| AC.3-3 | Rotating Year 2 | 497799 | 5368098 | Start | GRTS | 544.64 |
| AC.3-4 | Rotating Year 2 | 499460 | 5368643 | End | GRTS |  |
| AC.3-4 | Rotating Year 2 | 499460 | 5367015 | Start | 2015 | 1628.14 |
| AC.3-5 | Rotating Year 2 | 500704 | 5367748 | End | 2014 |  |
| AC.3-5 | Rotating Year 2 | 500704 | 5366879 | Start | 2015 | 869.35 |
| AC.4-1 | Rotating Year 3 | 498523 | 5368643 | End | GRTS |  |
| AC.4-1 | Rotating Year 3 | 498523 | 5367229 | Start | 2009 | 1414.49 |
| AC.4-2 | Rotating Year 3 | 500217 | 5368028 | End | GRTS |  |
| AC.4-2 | Rotating Year 3 | 500217 | 5366906 | Start | GRTS | 1122.31 |
| AC.4-3 | Rotating Year 3 | 501429 | 5367723 | End | GRTS |  |
| AC.4-3 | Rotating Year 3 | 501429 | 5366832 | Start | 2009 | 891.19 |
| AC.4-4 | Rotating Year 3 | 497724 | 5368643 | End | GRTS |  |
| AC.4-4 | Rotating Year 3 | 497724 | 5368334 | Start | GRTS | 309.05 |
| AC.4-5 | Rotating Year 3 | 499613 | 5368508 | End | GRTS |  |
| AC.4-5 | Rotating Year 3 | 499613 | 5366992 | Start | GRTS | 1515.79 |
| AC.5-1 | Rotating Year 4 | 501035 | 5367643 | End | GRTS |  |
| AC.5-1 | Rotating Year 4 | 501035 | 5366876 | Start | 2012 | 766.52 |
| AC.5-2 | Rotating Year 4 | 498889 | 5368643 | End | GRTS |  |
| AC.5-2 | Rotating Year 4 | 498889 | 5367126 | Start | 2012 | 1517.09 |
| AC.5-3 | Rotating Year 4 | 500550 | 5367837 | End | GRTS |  |
| AC.5-3 | Rotating Year 4 | 500550 | 5366869 | Start | GRTS | 967.85 |
| AC.5-4 | Rotating Year 4 | 501793 | 5367620 | End | 2012 |  |
| AC.5-4 | Rotating Year 4 | 501793 | 5366803 | Start | 2012 | 817.2 |
| AC.5-5 | Rotating Year 4 | 497702 | 5368643 | End | GRTS |  |
| AC.5-5 | Rotating Year 4 | 497702 | 5368380 | Start | GRTS | 262.02 |
| AC.6-1 | Rotating Year 5 | 499110 | 5368643 | End | GRTS |  |
| AC.6-1 | Rotating Year 5 | 499110 | 5367000 | Start | 2013 | 1643.24 |
| AC.6-2 | Rotating Year 5 | 500611 | 5367803 | End | GRTS |  |
| AC.6-2 | Rotating Year 5 | 500611 | 5367003 | Start | 2013 | 799.81 |
| AC.6-3 | Rotating Year 5 | 498642 | 5368643 | End | GRTS |  |
| AC.6-3 | Rotating Year 5 | 498642 | 5367219 | Start | 2013 | 1423.59 |
| AC.6-4 | Rotating Year 5 | 499950 | 5368201 | End | GRTS |  |
| AC.6-4 | Rotating Year 5 | 499950 | 5366954 | Start | 2013 | 1246.86 |
| AC.6-5 | Rotating Year 5 | 501290 | 5367680 | End | GRTS |  |
| AC.6-5 | Rotating Year 5 | 501290 | 5366846 | Start | 2013 | 833.9 |

***Monitoring & Analysis Objectives***

* Objectives: report on trends in cover classes (hierarchical) (see attached table from Protocol, I deleted one row that is the row referring to vegetation plot data which we do not have)
  + Broad classes: trees, shrubs, herbaceous, bare and developed – Link to Objective 1
  + Trends in origins in each vegetated class – hopefully this will be zero in trees (almost all should be native). Shrubs & herbaceous may both have changed. – Link to Objective 2 (table)
  + Status and trends in “quality” (Objective 3) – I shaded the two parts of this we will not be doing since it relies on veg plots
* Analysis of six years of data and summary report - *I think this original objective really includes the 3 below in that the summary report should:*
  + *Contain written descriptions of the analysis that can be plugged in to the journal article*
  + *Contain summaries of results that can be copied, pasted and revised to go in the article (RR has more confidence is revising wording for results or the next one than revising descriptions of statistics)*
  + *Include a summary of the problems you see in the data that might be the collection of the data, probably this will include ways that we know different observers or times of year might influence the categories*
  + *Recommendations on the subject of: 1) importance of annual vs rotating panels (may be a reiteration of initial discussions), 2) if we are going to miss a transect due to time constraints, how do we select which one?*
  + *R code for future analysis based on recommendations (as written below)*
* Collaboration in writing of a manuscript for submission to a peer review journal
* Review of monitoring methodology; collaborate in recommendations of revisions to current protocol.
* Provide R code for future analysis based on the recommendations for revisions to the monitoring and analysis methods.

**Modified Table 1**. Hierarchy of monitoring questions and link to management issue.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Objective | Metric type | Response Variables | Ecological Integrity Rating1 | | | |
| Good | Caution | | Significant Concern |
| 1. Detect change in the extent of physiognomic cover types | Landscape Structure | Cover Type: forest vs. non-forest2 | <10% difference between annual estimate of either tree or non-tree cover from baseline | 10-30% difference between annual estimate of either tree or non-tree cover from baseline | | >30% difference between annual estimate of either tree or non-tree cover from baseline |
| 2. Detect change in the proportion of area dominated by exotic plant species | Vegetation Community Structure | Total Park Cover | <10% of area is dominated by exotic species | 11-30% of area is exotic | | >30% of area is exotic |
| Tree (forest) Cover | <10% of area is exotic | 11-30% of area is exotic | | >30% of area is exotic |
| Shrub Cover | <10% of area is exotic | 11-30% of area is exotic | | >30% of area is exotic |
| Herbaceous Cover | <10% of area is exotic | 11-30% of area is exotic | | >30% of area is exotic |
| 3. Detect change in quality of native herbaceous communities | Quality of Native Herbaceous Communities | Exotic Cover | 90% of native-dominated areas have <10% exotic cover | <50% of native-dominated areas have >50% exotic cover | | >50% of native-dominated areas have >50% exotic cover |
| Mean C3 | >10 | 4-10 | 1-3 | |
| Average Weed Score4 | ≥-1 | -1 to -2 | < -2 | |

1 Ecological integrity rating reflects the status of the parameter and trend will be used as a modifier to describe whether the condition of the parameter is stable, improving, or declining.

2 The baseline for this objective is the ratio of forest to nonforest cover that was present during the historic period of significance 1853-1875. The metric for this parameter will be the ratio of soils that developed under forest vs. non- forest vegetation as interpreted by the soils survey (see Figures 4 and 5) as this reflects the cover types that were present during the historic time period.

3 The mean C will be used in concert with native species richness, FQI, and native species cover. The estimates in the table are preliminary estimates based on pilot data, see Appendix B.

4 Weed score is based on local ranking that is under development following Bowers and Boutin 2008, see Appendix B.