Supplementary Material for

Quality Control and Assessment of Interpreter Consistency of Annual Land Cover Reference Data in an Operational National Monitoring Program

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Tables S1, S2a-S2d and S3
LCMS-LCMAP TIMESYNC JOINT RESPONSE DESIGN v.4.0.5 (3.15.2018)

Table S1: Interpreter participation in collecting LCMAP reference data. Rows give the number of interpretations completed by each interpreter per set. Interpreter affiliations: (a) = contractor to USGS EROS; (b) USGS scientist; (c) = Utah State University student, through arrangement with the USFS; (d) =Utah State University faculty, through arrangement with the USFS; (e) = Utah State University graduate student through arrangement with USFS; (f) = USFS scientist. The three senior interpreters are shown with an asterisk.

Interpreter ID	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Set 7	Set 8	Set 9	Set 10	Set 11	Set 12	Sets 1-12
105 *(a)**	200	200	200	200	239	222	200	200	200	200	245	200	2506
106 *(f)*	200												200
107 *(b)*			200		39	5		100	100	200	165		809
109 *(a)**	200	200	200	200	238	200	200	200	200	200	200	200	2438
122 *(a)*	200	200	200	200	200	150	200	200	200	200	45	100	2095
123 *(b)*	200	200	200	200	200	200	200	200	200	200	200	200	2400
132 *(a)**		200	200	200	238	223	200	200	200	200	245	200	2306
136 *(c)*				200	200								400
137 *(d)*				200	200	200	200	100	100	200	100	100	1400
138 *(e)*				200	200	200	200			200			1000
139 *(c)*				200	200								400
141 *(c)*				200	6	200							406
144 *(c)*				200	240	200	200	200	200	200	200	200	1840
146 *(c)*									200	200	200	200	800
Total interpretations	1000	1000	1200	2200	2200	1800	1600	1400	1600	2000	1600	1400	19000

Tables S2a – S2d: Overall and per-class agreement by region for randomly selected subsample of pixels.

	East	Duplicate Interpretations									
		Water	Developed	Disturbed	Barren	Tree Cover	Grass/Shrub	Cropland	Wetland	Total	Agreement %
Initial Interpretations	Water	1515	12	1						1528	99
	Developed	18	1524	35		135	74	34	18	1838	83
	Disturbed		11	164		79	24	14	29	321	51
	Barren		1	1	32			1		35	91
	Tree Cover		131	77		10245	205	42	418	11118	92
	Grass/Shrub		45	37		318	1411	403	8	2222	64
	Cropland		111	10		110	203	2193		2627	83
	Wetland	33		23		240	27		1305	1628	80
	Total	**1566**	**1835**	**348**	**32**	**11127**	**1944**	**2687**	**1778**	**21317**	
										18389	Agree
	Agreement %	97	83	47	100	92	73	82	73	**86.3**	**Overall agreement**

	East Central	Duplicate Interpretations									
		Water	Developed	Disturbed	Barren	Tree Cover	Grass/Shrub	Cropland	Wetland	Total	Agreement %
Initial Interpretations	Water	2336	13	1		33			68	2451	95
	Developed		1107	8		143	33			1291	86
	Disturbed	2	17	65		63	14	5	39	205	32
	Barren										
	Tree Cover		44	39		4649	316		169	5217	89
	Grass/Shrub	66	33	9		116	1039	319	44	1626	64
	Cropland		30	7		5	226	4794	33	5095	94
	Wetland	81		6		227	67	42	1215	1638	74
	Total	**2485**	**1244**	**135**		**5236**	**1695**	**5160**	**1568**	**17523**	
										15205	Agree
	Agreement %	94	89	48		89	61	93	77	**86.8**	**Overall agreement**

	West Central	Duplicate Interpretations									
		Water	Developed	Disturbed	Barren	Tree Cover	Grass/Shrub	Cropland	Wetland	Total	Agreement %
Initial Interpretations	Water	461	33	25			34			553	83
	Developed	31	864	6		21	55	30		1007	86
	Disturbed	3	29	66		14	29	14	3	158	42
	Barren			5			34			39	0
	Tree Cover		125	28		1809	301	32		2295	79
	Grass/Shrub		199	30		263	12177	508	21	13198	92
	Cropland		34	40			669	8970	29	9742	92
	Wetland	11		19		132	125	29	341	657	52
	Total	**506**	**1284**	**219**		**2239**	**13424**	**9583**	**394**	**27649**	
										24688	Agree
	Agreement %	91	67	30		81	91	94	87	**89.3**	**Overall agreement**

	West	Duplicate Interpretations									
		Water	Developed	Disturbed	Barren	Tree Cover	Grass/Shrub	Cropland	Wetland	Total	Agreement %
Initial Interpretations	Water	605		12	3		34			654	93
	Developed	27	610	11	6		63			717	85
	Disturbed	1	8	127	1	45	38	5	1	226	56
	Barren	3		7	576	29	385			1000	58
	Tree Cover		3	39		7620	867	5		8534	89
	Grass/Shrub		143	29	461	747	16529	151	33	18093	91
	Cropland			1	13		54	1163		1231	94
	Wetland	40		6		33	118		291	488	60
	Total	**676**	**764**	**232**	**1060**	**8474**	**18089**	**1324**	**325**	**30943**	
										27521	Agree
	Agreement %	89	80	55	54	90	91	88	90	**88.9**	**Overall agreement**

Table S3: Per-class agreement for interpretations from each year of the time series.

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Water	95	94	94	94	94	94	95	95	95	95	95	95	95	95	94	93	94	94	94	95	95	95	95	95	95	95	95	94	94	94	94	94	94
Developed	83	82	82	83	82	83	83	83	83	81	82	82	82	83	82	81	81	82	82	81	81	82	82	82	83	83	82	83	83	83	83	82	83
Disturbed		37	39	44	41	34	23	37	52	47	57	49	56	51	37	47	50	34	41	49	44	52	47	53	46	50	38	55	40	58	49	46	44
Barren	52	53	53	54	54	54	54	56	55	56	56	57	58	58	58	58	58	58	58	58	56	57	57	57	57	57	57	57	55	58	57	55	54
Tree Cover	91	90	90	90	90	89	89	89	89	90	90	90	89	89	89	89	89	89	89	90	90	90	90	89	90	91	90	90	90	90	90	90	90
Grass/Shrub	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	89	88	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Cropland	90	90	91	91	91	90	90	91	90	90	91	91	91	91	91	91	91	91	91	91	92	93	93	92	92	92	93	92	93	92	92	92	92
Wetland	77	75	75	75	73	74	75	74	75	75	74	74	74	73	74	74	74	74	74	75	74	73	75	75	75	74	73	75	73	75	73	75	75
Overall	88	88	88	88	88	88	87	87	88	88	88	88	88	88	88	88	88	88	88	88	88	89	88	89	89	88	89	88	89	89	89	89	89

LCMS-LCMAP
TIMESYNC JOINT RESPONSE DESIGN

v.4.0.5 (3.15.2018)

INTRODUCTION

This document describes the approach (or response design) for using the pixel-based TimeSync time series visualization tool to collect reference information for the joint LCMS/LCMAP effort to comprehensively map land cover and land use change across the US using the Landsat data record from 1984-present. For any given pixel, TimeSync is used to temporally demarcate Landsat spectral trajectories into observable change segments, following the logic of Cohen et al. (2010) and Kennedy et al. (2010). Segments are approximately linear spectral trends commonly associated with vegetation disturbance and regrowth processes, and may involve either land use or land cover change or both. Vertices define start and end dates of a given segment and have descriptors that characterize both the land use and land cover before and after a change event. Occasional snow cover or recurring inundation of wetland areas that does not significantly alter the longer-term trajectory of shrubs and trees are not considered disturbances. Disturbances in non-forest environments are possible, such as grassland fires or mechanical removal of vegetation in shrub dominated systems. Disturbances are also declared for land use changes (e.g., agricultural land transformed into a housing development). Growth/recovery is a change process that involves vegetation growth, commonly associated with post-disturbance vegetation succession but also with accumulation of vegetation in areas where growth was previously inhibited. Integrating the cover and use data can yield additional information that is not readily apparent from the individual interpretation elements. For example, land use conversions (e.g., forest to non-forest) will be identified by the pre- and post-change vertex labels.

The response design is not static, thus this document will be updated as necessary. It is important to document challenges, inconsistencies, or other remarkable situations that arise during the interpretations. Regular meetings among interpreters and other critical players should take place to discuss these challenging observations and resolve them.

HOW THE RESPONSE DESIGN WORKS?

The joint LCMS/LCMAP design requires interpreters to make selections from land use, land cover and change process variables, and checkboxes (if relevant). When interpreting the variables several rules must be adhered to:

1. ***All calls are explicitly based on the 1-pixel plot area***. However, it is important to view the surrounding area and temporal history (both in and around the plot) so that calls reflect a convergence of all available evidence.
2. ***For all plots the dominant land use and land cover are recorded, based on areal majority of the 1-pixel plot***. Note that forest use is a special case, in that four specific criteria must be met in order to qualify (see definition below).
3. ***In addition to recording the dominant land use and land cover classes, a series of checkboxes are used to record all secondary land use and land cover elements which occupy 10% or more of the 1-pixel plot area***. Where there are multiple checkboxes, more than one can be chosen. In some cases, the checkboxes are mutually exclusive, in other cases they are not. This should be obvious from the context.
4. ***When recording land cover, do not base calls solely on Google Earth images which may be temporally misaligned with the Landsat chips.*** Except for rotational croplands and hay lands (where cover is always set to grass/forb/herb), land cover should be based on the spectral response of the specific Landsat date selected in the chip gallery.
5. ***The land use class "Other" is used for snow/ice, water, salt flats and other unlisted use types. "Other" can also be used if a plot is predominately covered by trees but the forest and developed land use definitions are not met***.
6. ***For each plot, all change processes which impact any portion of the 1-pixel plot area should be recorded***. Note that change processes can result in either land use or land cover transitions or both. Changes occurring in successive years, such as the intensification of development or incremental harvesting in forests should be recorded with a single, multi-year segment.
7. ***The change process "Other" is an option for disturbance processes***. However, this should be rarely used, and only when there is certainty about disturbance but uncertainty about cause.
8. ***There are two site-prep fire checkboxes***. The one under fire is used when the site-prep fire results in a separate, distinguishable disturbance segment, whereas the one under harvest is used when only the site-prep fire is seen but we also want to capture the harvest event preceding it.
9. ***Ancillary data layers will be used to guide interpretation of the land use, land cover and change process variables***. A separate document (called TimeSync_UseOfAncillaryData_v3.0.2.docx) describes the available ancillary datasets and how they will be used. Tier 1 layers (e.g. burn perimeters from Monitoring Trends in Burn Severity (MTBS) and wetland boundaries from the National Wetland Inventory (NWI), etc.) are easily accessible and will offer valuable insights, thus they should be used by all analysts. Tier 2 layers (e.g. USDA Crop Data Layer (CDL), U.S. Forest Service Forest Type map, etc.) will likely be of more limited value,

therefore should only be used to corroborate evidence seen in more reliable data layers. Ancillary data should always be used with caution, and should never be used to make calls that are inconsistent with the Landsat data (or more reliable ancillary data).

VERTEX LABELS: DOMINANT LAND USE

(Checkboxes used to record all secondary land use elements >=10% of the 1 pixel plot area)

DEVELOPED – Land covered by man-made structures (e.g. high density residential, commercial, industrial, mining or transportation), or a mixture of both vegetation (including trees) and structures (e.g., low density residential, lawns, recreational facilities, cemeteries, transportation and utility corridors, etc.), including any land functionally altered by human activity. Narrower forest and agricultural roads, which are not used to move from one town to another, are considered forest or agricultural land use, respectively.

- In the event that strip mining, open-pit mining, oil and gas pads, quarries, or mountain top removal is observed a checkbox will be used to indicate the presence of **Mining** activity. Since mines are often restored to a natural or economically usable state via reclamation, it is imperative that the full time series be inspected so that subsequent changes in land use and land cover are accurately recorded. Once a site has been reclaimed, it should no longer be labeled as mining land use.

FOREST – Land that is planted or naturally vegetated and which contains (or is likely to contain) 10% or greater tree cover at some time during a near-term successional sequence. This may include deciduous, evergreen and/or mixed categories of natural forest, forest plantations, and woody wetlands. In

accordance with FIA's definition of forest, trees (or the ground area with potential for trees) must be a minimum of 1 acre in size (i.e. approximately >= 5 contiguous Landsat pixels) and at least 120 feet wide (i.e. approximately 1 Landsat pixel). Patches of 5 or more adjoining pixels can take any shape including linear. In addition to meeting the size/shape criteria, there should also be no evidence that management (e.g., mowing, paving) has suppressed or inhibited natural regeneration. Forest roads (i.e. those that are not used for public transport from town to town), are considered forest land use. For situations where trees occupy a majority of the plot area but do not meet the size/shape criteria for forest (described above), use will revert to "other" unless there is evidence of management or other human activity that better qualifies as developed use. Actively managed Christmas tree farms (or tree nurseries), orchards and vineyards are considered agriculture.

- A **Wetland** checkbox will be used when a plot which meets the criteria for Forest use also occurs where constant or recurrent shallow inundation or saturation of water is a determining factor in shaping the physical characteristics of the underlying vegetation and soils. Ancillary data including NWI boundaries, soils and topography will be used for supporting evidence. In certain situations (e.g. when forest trees obscure sub-canopy conditions) ancillary data alone may be used to make a wetland call only if the Landsat or Google Earth imagery do not explicitly contradict it. Note that without land use change (e.g. events which create or lead to the loss of wetlands) this is a permanent condition. (see WetlandIdentification_Guidance.doc)

AGRICULTURE – Land used for the production of food, fiber and fuels which is in either a vegetated or non-vegetated state. This includes but is not limited to cultivated and uncultivated croplands, hay lands,

orchards, vineyards, confined livestock operations, and areas planted for production of fruits, nuts or berries. Roads used primarily for agricultural use (i.e. not used for public transport from town to town) are considered agriculture land use. Note that for rotational croplands and hay lands, land cover calls **do not** need to capture ephemeral changes brought on by regular periods of mowing, plowing, and planting. Rather to promote consistency, land cover for these classes should always be set to grass/forb/herb regardless of the cover depicted in the annual image chips.

- In an effort to better distinguish food production from managed hay lands specific evidence of **Row crops** and **Orchard/Tree farms/Vineyards** will be recorded with a series of checkboxes. If the Row crop checkbox is used, land cover should automatically be set to grass/forb/herb as described above. However, if the Orchard/Tree farms/Vineyards checkbox is used, land cover should be based on the specific cover elements observed in the Landsat date selected in the chip gallery (per rule 4 above, under how the response design works).

NON-FOREST WETLAND – Lands adjacent to or within a visible water table (either permanently or seasonally saturated) dominated by shrubs or persistent emergents. In accordance with the Federal Geographic Data Committee's target mapping unit (see FGDC, 2013), the wetland must be at least 0.5 acres in size (i.e. approximately >= 2 contiguous Landsat pixels). These wetlands may be situated shoreward of lakes, river channels, or estuaries; on river floodplains; in isolated catchments; or on slopes. They may also occur as prairie potholes, drainage ditches and stock ponds in agricultural landscapes and may also appear as islands in the middle of lakes or rivers. Other examples also include marshes, bogs, swamps, quagmires, muskegs, sloughs, fens, and bayous. Note that without land use change (e.g. events which create or lead to the loss of non-forest wetlands) this a permanent condition.

Ancillary data including NWI boundaries, soils, and topography layers will be used for supporting evidence. Note that in forests, wetlands are indicated with a checkbox as described above under forest use.

RANGELAND/PASTURE – This class includes any area that is either a.) **Rangeland**, where vegetation is a mix of native grasses, shrubs, forbs and grass-like plants largely arising from natural factors and processes such as rainfall, temperature, elevation and fire, although limited management may include prescribed burning as well as grazing by domestic and wild herbivores; or b.) **Pasture**, where vegetation may range from mixed, largely natural grasses, forbs and herbs to more managed vegetation dominated by grass species that have been seeded and managed to maintain near monoculture. Pasture management may include seeding, and more intensive grazing, and sometimes includes fertilization and irrigation. Also included in the Rangeland/Pasture use class are any areas where limited water availability and seasonally cold temperatures have naturally led to the dominance of grasses, forbs and herbs minus the aid of human management and livestock grazing. Examples include high elevation tundra, alpine meadows, non-grazed short and tallgrass prairies, glades (i.e. openings in forests where local conditions such as avalanches, poor soils, or fire have created semi-permanent clearings) and mountain balds (e.g. treeless summits commonly found in the Appalachian mountains of the southeastern U.S.). Grassy areas that are mowed or otherwise managed for open space (e.g. greenways), recreation (e.g. parks) or transportation corridors (e.g. medians strips) should be labeled as developed land use. Care should be taken to ensure oak woodlands and pinyon-juniper dominated systems that meet the minimum tree cover and patch size thresholds are classified as forest land use.

OTHER – Lands which are perennially covered with snow and ice, water, salt flats and other undeclared classes. Glaciers and ice sheets or places where snow and ice obscure any other land cover call are included (assumed is the presence of permanent snow and ice; otherwise a different class is more appropriate). Water includes rivers, streams, canals, ponds, lakes, reservoirs, bays, or oceans. This assumes permanent water (which can be in some state of flux due to ephemeral changes brought on by climate or man); otherwise a different class is more appropriate. Other can also be used if trees occupy a majority of the 1-pixel plot area but neither the forest use nor developed land use definitions are met.

VERTEX LABELS: DOMINANT LAND COVER

(Checkboxes used to record all secondary land cover elements >=10% of the 1 pixel plot area)

TREE – Land comprised of live or standing dead trees.

SHRUB – Land vegetated with shrubs.

GRASS/FORB/HERB – Land covered by perennial grasses, forbs, or other forms of herbaceous vegetation.

IMPERVIOUS – Land covered with man-made materials that water cannot penetrate, such as paved roads, rooftops, and parking lots.

BARREN – Land comprised of bare soil exposed by disturbance (e.g., soil uncovered by mechanical clearing and/or forest harvesting), as well as perennially barren areas such as deserts, playas, rock outcroppings (including minerals and other geologic materials exposed by surface mining activities), sand dunes, salt flats, and beaches. Roads made of dirt and gravel are also considered barren.

SNOW/ICE – Land covered by snow and ice.

WATER – Land covered by water.

SEGMENT LABELS: CHANGE PROCESSES

(Record all changes which impact any portion of the 1-pixel plot area)

FIRE – Land altered by fire, regardless of the cause of the ignition (natural or anthropogenic), severity, or land use. MTBS burn perimeters will be used for supporting evidence and to help guide date selection of image chips, but because smaller fires < 1,000 acres in the west and < 500 acres in the east are not included in this data set, and since burn perimeters also contain unburned islands, MTBS cannot be exclusively used to determine whether a plot has burned or not. In drier western forests, post-fire increases in brightness resulting from delayed crown loss and dissipation of char/ash can result in second year spectral changes which move in the direction of disturbance. Unless a second, post-fire disturbance can be confirmed (e.g. salvage logging or mechanical site prep), a separate growth/recovery segment should be used to capture these changes along with a note indicating "delay" in the comments box.

- A checkbox will be used to capture the occurrence of post-harvest **Site-prep fires** which result in a separate, distinguishable disturbance segment. For instances where burning is evident but the preceding harvest is not, the site-prep fire option under harvest should be used instead. Checkboxes also exist to distinguish between natural and prescribed burning.

HARVEST – Forest land where trees, shrubs or other vegetation have been severed or removed by anthropogenic means. Examples include clearcutting, salvage logging after fire or insect outbreaks, thinning and other forest management prescriptions (e.g. shelterwood/seedtree harvest). Some systems are managed such that a few trees are removed over the course of several consecutive years, and in this case it is best to declare a single, multi-year harvest segment. ***The harvest change process should only be used when the pre-harvest land use has been declared as forest. Forest to non-forest conversions will be resolved by combining the harvest change process with pre- and post-land use classes****.*

- A series of checkboxes will be used to record evidence of **Clearcutting** (defined as the complete removal of all trees/vegetation from a site), **Thinning** (defined as the partial removal of trees/vegetation but with some proportion of residual trees/vegetation left behind), and **Site-prep fires** (e.g. where vegetation and debris remaining after clearcutting is burned to ready the site for planting). ***This site-prep fire option is used only in circumstances where burning is evident, but the preceding harvest is not directly seen due to image acquisition timing or cloud cover obstruction. In the event a site-prep fire results in a separate, distinguishable change segment, the site-prep checkbox under fire should be used instead****.*

MECHANICAL – Non-forest land where trees, shrubs or other vegetation has been mechanically severed or removed by chaining, scraping, brush sawing, bulldozing, or any other methods of non-forest vegetation removal. Mechanical is also used when non-forest land (either in a vegetated or non-vegetated state) is cleared for development or previously built-up land (e.g. concreate parking lot) is intensified with new structures. ***Except in cases where non-tree vegetation is cleared immediately after harvesting (e.g. to prepare a site for planting) the mechanical change process should only be used for non-forest land uses****.*

STRUCTURAL DECLINE – Land where trees or other woody vegetation is physically altered by unfavorable growing conditions brought on by non-anthropogenic or non-mechanical factors. This type of decline should generally create a trend in the spectral signal(s) (e.g. NDVI decreasing, Wetness decreasing; SWIR increasing; etc.) however the trend can be subtle. Structural decline occurs in woody vegetation environments, most likely from insects, disease, drought, acid rain, etc. Clear evidence of tree or shrub mortality and/or loss of leaf area should be observed in the high resolution images or the Landsat chips, or there should be other corroborating evidence. Structural decline can include defoliation events that do not result in mortality such as in Gypsy moth and spruce budworm infestations which may recover within 1 or 2 years. This type of change can include both single and multi-year events.

SPECTRAL DECLINE – A plot where the spectral signal shows a trend in one or more of the spectral bands or indices (e.g. NDVI decreasing, Wetness decreasing; SWIR increasing; etc.), but the trend is **not** associated with the visible loss of leaves or woody vegetation. More subtle negative trends (slope equivalent to <.1 NDVI units over 20 years) should be recorded as stable. Examples include cases where:

a) non-forest/non-woody vegetation shows a decline trend (e.g. NDVI decreasing, Wetness decreasing; SWIR increasing; etc.), or **b)** where woody vegetation shows a decline trend which is not related to the loss of woody vegetation, such as when mature tree canopies close resulting in increased shadowing, when species composition changes from conifer to hardwood, or when a dry period (as opposed to stronger, more acute drought) causes an apparent decline in vigor, but no loss of woody material or leaf area.

WIND/ICE – Land (regardless of use) where vegetation is altered by wind from hurricanes, tornados, storms and other severe weather events including freezing rain from ice storms.

HYDROLOGY – Land where flooding has significantly altered woody cover or other Land cover elements regardless of land use (e.g. new mixtures of gravel and vegetation in and around streambeds after a flood). Flood disturbances with a clear effect on forest health or which induce a prolonged recovery period should also be included, whereas floods that only affect the understory and recover within a year or two are considered ephemeral.

- Checkboxes are used to record specific evidence of **Flooding** and **Reservoir/Lake water fluctuations** (which include swampy areas or lake/reservoir edges which rise and fall due to changes in climate or management.)

DEBRIS – Land (regardless of use) altered by natural material movement associated with landslides, avalanches, volcanoes, debris flows, etc. Movement of materials in riverine systems are labeled as hydrology.

GROWTH/RECOVERY – Land exhibiting an increase in vegetation cover due to growth and succession over one or more years. Applicable to any areas that may express spectral change associated with vegetation regrowth. In developed areas, growth can result from maturing vegetation and/or newly installed lawns and landscaping. In forests, growth includes vegetation growth from bare ground, as well as the over topping of intermediate and co-dominate trees and/or lower-lying grasses and shrubs. Growth/Recovery segments recorded following forest harvest will likely transition through different land cover classes as the forest regenerates. This will require adding extra vertices to capture these cover changes within what might otherwise be a single change process segment. Use natural break points in the spectral trajectory, as well as high resolution images in Google Earth to help guide temporal placement of these vertices. Note, in highly managed systems not all forests will predictably progress

through all three stages of succession, thus its possible recovery will proceed straight from bare ground to trees. Accurately assigning the timing of these transitional cover stages is difficult, however use your best judgment and try and capture as much detail as possible. In the later stages of succession, when regrowth is dominated by trees, spectral growth trends become slower and more gradual. For these changes to be considered growth/recovery, spectral values should closely adhere to an increasing trend line (e.g. a positive slope that would, if extended to ~20 years, be on the order of .10 units of NDVI) which persists for several years. Slightly increasing trends, such as those with very low slopes (e.g. on the order of < .10 NDVI units) should be labeled as stable.

STABLE – Where no significant change is evident in the spectral response and the trend is essentially flat. Agricultural systems and wetlands are commonly highly variable spectrally through time, and are thus considered stable but ephemeral.

OTHER – Land (regardless of use) where the spectral trend or other supporting evidence suggests a disturbance or change event has occurred but the definitive cause cannot be determined or the type of change fails to meet any of the change process categories defined above. The comment field in TimeSync should be used to further describe the situation encountered.

REFERENCES

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