MISCELLANEOUS CHROMOSOME NUMBER REPORTS FOR *POA* (POACEAE) IN NORTH AMERICA

Robert J. Soreng

Department of Botany
National Museum of Natural History
Smithsonian Institution
Washington, DC 20013-7012, U.S.A.
sorengr@si.edu

ABSTRACT

The following 66 chromosome numbers and vouchers for 24 species of *Poa* L. are reported from Canada, México, and the U.S.A.: *P. abbreviata* subsp. *pattersonii*, 2*n* = 42, 2*n* = 42, 2*n* = 42; *P. alpina*, 2*n* = 28+II, 2*n* = 32+I (2×), 2*n* = 40+I, 2*n* = 42, 2*n* = 56; *P. arctica* subsp. *aperta*, 2*n* = 98+I; subsp. *arctica*, 2*n* = 56; subsp. *arctica* (longipila form), 2*n* = 56–59, 2*n* = 80, 2*n* = 88; *P. atropurpurea*, 2*n* = 28; *P. bigelovii*, 2*n* = 28+I; *P. cusickii* subsp. *pallida*, 2*n* = 56+II; *P. fendleriana* subsp. *albescens*, 2*n* = 28+II, 2*n* = 56; subsp. *fendleriana*, 2*n* = 56 (4×), 2*n* = 59, 2*n* = 58–60, 2*n* = 58–64; subsp. *longiligula*, 2*n* = 56, 2*n* ca. 56; *P. glauca* subsp. *glauca*, 2*n* = 56, 2*n* = 56–58; subsp. *rupicola*, 2*n* = 48, 2*n* = 48–50, 2*n* = 54–56, 2*n* ca. 100; *P. interior*, 2*n* = 42; *P. laxa* subsp. *banffiana*, 2*n* = 84; *P. leptocoma* 2*n* = 42 (2×); *P. lettermanii*, 2*n* = 14; *P. napensis*, 2*n* = 42; *P. nervosa*, 2*n* = 28; *P. occidentalis*, 2*n* = 14 (2×), 2*n* = 28; *P. paucispicula*, 2*n* = 42; *P. piperi*, 2*n* = 28; *P. pratensis* subsp. *alpigena*, 2*n* = 56+III; *P. reflexa*, 2*n* = 28 (4×); *P. secunda* subsp. *juncifolia*, 2*n* = 63; subsp. *secunda*, 2*n* = 84–88+II; *P. sierrae*, 2*n* ca. 58; *P. strictiramea*, 2*n* = 28–29, 2*n* = 29+II; *P. supina* c.v. SUPERNOVA, 2*n* = 14; *P. tracyi*, 2*n* = 28 (5×), 2*n* = 28+I; *P. unilateralis* subsp. *pachypholis*, 2*n* = 42; and *P. unilateralis* subsp. *unilateralis*, 2*n* = 84.

RESUMEN

Se citan 66 números cromosomáticos y testigos de 24 especies de *Poa* L. de Canadá, México, y E.E.U.U.: *P. abbreviata* subsp. *pattersonii*, 2*n* = 42; *P. alpina*, 2*n* = 28+II, 2*n* = 32+I (2×), 2*n* = 40+I, 2*n* = 42, 2*n* = 56; *P. arctica* subsp. *aperta*, 2*n* = 98+I; subsp. *arctica*, 2*n* = 56; subsp. *arctica* (forma longipila), 2*n* = 56–59, 2*n* = 80, 2*n* = 88; *P. atropurpurea*, 2*n* = 28; *P. bigelovii*, 2*n* = 28+I; *P. cusickii* subsp. *pallida*, 2*n* = 56+II; *P. fendleriana* subsp. *albescens*, 2*n* = 28+II, 2*n* = 56; subsp. *fendleriana*, 2*n* = 56 (4×), 2*n* = 59, 2*n* = 58–60, 2*n* = 58–64; subsp. *longiligula*, 2*n* = 56, 2*n* ca. 56; *P. glauca* subsp. *glauca*, 2*n* = 56, 2*n* = 56–58; subsp. *rupicola*, 2*n* = 48, 2*n* = 48–50, 2*n* = 54–56, 2*n* ca. 100; *P. interior*, 2*n* = 42; *P. laxa* subsp. *banffiana*, 2*n* = 84; *P. leptocoma* 2*n* = 42 (2×); *P. lettermanii*, 2*n* = 14; *P. napensis*, 2*n* = 42; *P. nervosa*, 2*n* = 28; *P. occidentalis*, 2*n* = 14 (2×); *P. paucispicula*, 2*n* = 42; *P. piperi*, 2*n* = 28; *P. pratensis* subsp. *alpigena*, 2*n* = 56+III; *P. reflexa*, 2*n* = 28 (4×); *P. secunda* subsp. *juncifolia*, 2*n* = 63; subsp. *secunda*, 2*n* = 84–88+II; *P. sierrae*, 2*n* ca. 58; *P. strictiramea*, 2*n* = 28–29, 2*n* = 29+II; *P. supina* c.v. SUPERNOVA, 2*n* = 14; *P. tracyi*, 2*n* = 28 (5×), 2*n* = 28+I; *P. unilateralis* subsp. *pachypholis*, 2*n* = 42; y *P. unilateralis* subsp. *unilateralis*, 2*n* = 84.

The Flora of North America North of México (Morin et al. 1993) editorial policy requires that chromosome numbers be independently published prior to being reported in the treatments. Therefore, I am reporting a series of chromosome counts here for *Poa* that are unreported or only mentioned with partial voucher

SIDA 21(4): 2195 – 2203. 2005

TABLE 1. Voucher information for chromosome counts in the genus *Poa* that are new or mentioned with no or only partial voucher information in Soreng (1985, 1990, 1991a, 1991b, 1993, 1998) and Soreng and Hatch (1983). *RJS = R.J. Soreng, RWS = R.W. Spellenberg.*

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
Poa abbreviata subsp. *pattersonii* (Vasey) A. Löve, D. Löve & B.M. Kapoor	U.S.A. Colorado:	Clear Cr. Co.: Rocky Mts., Mt. Evens top, SSE of Georgetown ca. 13 km, 3 Aug 1984, *RJS, R. Bayer, M. Dunford & G.L. Stebbins 2555* (US)	**42** (Soreng 1991b, with partial voucher) information
	Colorado:	Summit/Park Co. boundary, Rocky Mts., Tenmile Range, North Star Mt., Hoosier Ridge W of Hoosier Pass, 2 Aug 1984, *RJS, R. Bayer, M. Dunford & G.L. Stebbins 2548* (US)	**42** (Soreng 1991b, with partial voucher information)
	Montana:	Deer Lodge Co.: Anaconda-Pintlar Wilderness, Mt. Tiny, above Storm Lk., 6 Aug 1980, *RJS & RWS 1165-2* (US)	*n* = **21,** from pollen division (Soreng 1991b, with partial voucher information)
Poa alpina L.	CANADA. Alberta:	Banff N.P., ca. 100 km N of Banff on hwy 93, E slopes of Mt. Peyto, S of Peyto Lk., N of Bow Lk., 28 Jul 1980, *RJS & RWS 1018* (US)	**42** (new)
	Alberta:	Plateau Mt., between Mt. Livingston and Mt. Burke, ca. 67 km due N of Colman, 2 Aug 1980, *RJS & RWS 1105* (US)	**56** (new)
	U.S.A. Colorado:	Sagauche Co.: San Luis Mts., N slope of Baldy Chato, off Big Meadow Rd. FR 790, 17 Aug 1980, *RJS & RWS 1406-a* (US)	**28+II** (new)
	Colorado:	Sagauche Co.: San Luis Mts., N slope of Baldy Chato, off Big Meadow Rd. FR 790, 17 Aug 1980, RJS *& RWS 1406-b* (US)	**32+I** (new)
	Wyoming:	Park Co.: Beartooth Pass, E summit, 8 Aug 1980, *RJS & RWS 1213-5* (US)	**40+I** (new)
	Wyoming:	Sublett Co.: Little Sheep Mt., NW of N end of Green Lakes ca. 6 km, 10 Aug 1980, *RJS & RWS 1290* (US)	**32+I** (new)
Poa arctica subsp. *aperta* (Scribn. & Merr.) Soreng	U.S.A. Colorado:	Sagauche Co.: San Luis Mts., N slope of Baldy Chato, off Big Meadow Rd., FR 790, 17 Aug 1980, *RJS & RWS 1412-a* (US)	**99** (Soreng 1985, without voucher)

TABLE 1. (continued)

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
Poa arctica R.Br. subsp. *arctica*	CANADA. Alberta:	Kananaskis Prov.P., at Kananaskis Summit (Highwood Pass), near Mt. Arethusa ca. 67 km S of Seebe and Hwy 1, on Hwy 40, on W side, 31 Jul 1980, *RJS & RWS 1094* (US)	**56** (new)
	U.S.A. Colorado:	Pitkin Co. (W of Lake Co. line?), Rocky Mts., Sawatch Range, Independence Pass, 15 Aug 1980, *RJS & RWS 1391* (US)	**88** (new)
	Montana:	Deer Lodge Co.: Anaconda-Pintlar Wilderness, Mt. Tiny, above Storm Lk., 6 Aug 1980, *RJS & RWS 1180* (US)	**80** (new)
	Montana:	Glacier Co.: Glacier N.P., Pigan Pass, 4 Aug 1980, *RJS & RWS 1142* (US)	**56–59** (new)
Poa atropurpurea Scribn.	U.S.A. California:	San Bernardino Co.: Baldwin Lake, 1985, *RJS 2632* (US)	**28** (Soreng 1993, without voucher)
Poa bigelovii Vasey & Scribn.	U.S.A. New Mexico:	Lincoln Co.: White Mts., NE of Sierra Blanca, below Monjeau L.O., 16 Jun 1981, *RJS 1584t* (US)	**28+I** (Soreng 1985, without voucher)
Poa cusickii subsp. *pallida* Soreng	U.S.A. Montana:	Park Co.: NE of Gardner 10 km, E of Jardine, Jun 08 1984, *RJS 2453-a* (US)	**56+II** (Soreng 1991a, with voucher, but location incomplete and number erroneously reported as *RJS 2456*)
Poa fendleriana subsp. *albescens* (Hitchc.) Soreng	MEXICO. Chihuahua:	Sierra Madre Occidental, Creel, near air strip, 15 Apr 1984, *RJS & RWS 2309* (US)	**56** (new)
	Sonora:	5 km NW of Cananea on microondas road N from road to Sonora, 19 Mar 1982, *RJS & RWS 1780-5* (US)	**28+II,** with inversion bridge & fragments (Soreng 1985, without voucher)
Poa fendleriana (Steud.) Vasey subsp. *fendleriana*	U.S.A. New Mexico:	Catron Co.: Sheridan Gulch, 21 May 1983, *RJS & D. Ward 2125* (US)	**56,** with multivalents (new)
	Mexico:	Dona Ana Co.: Organ Mts., W side, below and E of Baylor Pk., 10 Feb 1984, *RJS & R. Neilson 2190-b* (US)	**56** (new)

TABLE 1. (continued)

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
	Mexico:	Grant Co.: Black Range, 19 km NW of Mimbres, *D. Ward 81-04* (NMC)	**58–64** (new)
	Mexico:	Lincoln Co.: White Mts., Montgomery Biological Research Station, 8 km N of Ruidoso, 18 Apr 1981, *RJS 1580* (US)	**56** (new)
	Mexico:	Sandoval Co.: Sandia Mts., W base, Juan Tabo Picnic Area, NE of Albuquerque, 6 Jun 1983, *RJS & RWS 2172* (US)	**58–60** (new)
	Mexico:	Socorro Co.: San Mateo Mts., 21 Mar 1984, *RJS 2303* [no voucher]	**56** (new)
	MEXICO. Chihuahua:	Sierra Madre Occidental, 7 km E of Tomachic, 14 Apr 1984, *RJS 2306* (US)	*n* = **28+1,** mitotic, pistillate plant (new)
Poa fendleriana subsp. *longiligula* (Scribn. & T.A. Williams) Soreng	U.S.A. Arizona:	Apache Co.: Chuska Mts., 6.7 km NE of Lukachukai, on BIA-13, 9 Jun 1983, *RJS & RWS 2177* (US)	**56** (new)
	Wyoming:	Park Co.: Mammoth Hot Springs, 08 Jun 1984, *RJS 2454* (US)	*n* ca. **28,** mitotic (new)
Poa glauca Vahl subsp. *glauca*	CANADA. Alberta:	Plateau Mt., between Mt. Livingston and Mt. Burke, 67 km due N of Colman, 1 Aug 1980, *RJS & RWS 1098-3* (US)	56–58, meiosis irregular (new)
	U.S.A. New Mexico:	Taos Co.: Wheeler Peak, ridge 3.3 km N of peak, 0.4 km S of Frazer Mt., 19 Aug 1980, *RJS & RWS 1454-1* (US)	**56,** multivalents and laggers common (new)
Poa glauca subsp. *rupicola* (Nash) W.A. Weber	U.S.A. Colorado:	Pitkin Co.: Rocky Mts., Sawatch Range, Independence Pass, 15 Aug 1980, *RJS & RWS 1372-18* (US)	Ca. **100** (new)
	Wyoming:	Park Co.: Clay Butte Look-Out., ca. 2 km W of Beartooth Lk., 8 Aug 1980, *RJS & RWS 1221-2* (US)	**54–56,** multivalents (new)
	Wyoming:	dito, *RJS & RWS 1221-5* (US)	**48–50,** multivalents (new)
	Wyoming:	Sublett Co.: Top of Little Sheep Mt., NW of N end of Green Lakes ca. 6.25 km, 10 Aug 1980, *RJS & RWS 1299-6* (US)	**48** (new)
Poa interior Rydb.	U.S.A. Colorado:	Sagauche Co.: San Luis Mts., N slope of Baldy Chato, off Big Meadow Rd. FR 790, 17 Aug 1980, *RJS & RWS 1422-a-3* (US)	**42** (new)

TABLE 1. (continued)

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
Poa laxa Haenke subsp. *banffiana* Soreng	U.S.A. Montana:	Glacier Co.: Glacier N.P., Pigan Pass, 4 Aug 1980, *RJS & RWS 1137* (US)	**84** (Soreng 1991b, with partial voucher information)
Poa leptocoma Trin.	U.S.A. Montana:	Glacier Co.: Glacier N. P., Pigan Pass, 4 Aug 1980, *RJS & RWS 1148-4* (US)	**42** (Soreng & Hatch 1983)
	Utah:	Summit Co.: Mt. Murdock E of Bald Mt. Pass, Hwy 150, 12 Aug 1980, *RJS & RWS 1347-2* (US)	**42** (new)
Poa lettermanii Vasey	CANADA or U.S.A.:		**14** (A. Löve, pers. com., letter ca. 1982, reported by, Soreng 1991a, voucher unknown)
Poa napensis Beetle	U.S.A. California:	Napa Co.: Calistoga, S end of landing strip W of Lincoln Ave., 27 May 1986, *RJS 2926* (US)	**42** (Soreng 1991a, with partial voucher and location)
Poa nervosa (Hook.) Vasey s.str. (excluding *Poa wheeleri* Vasey)	U.S.A. Oregon:	Marion Co.: Silver Cr. Falls S.P., Winter Falls, 6 Jun 1986, *RJS 2960* (US)	**28** (new)
Poa occidentalis Vasey	U.S.A. New Mexico:	Rio Ariba Co.: SW of Coyote, Puerco C.G., ca. 33 km NW of Los Alamos, 15 Aug 1978, *RJS & S.L. Hatch 48* (US)	**14** (Soreng & Hatch 1983)
	New Mexico:	Otero Co.: Sacramento Mts., ca. 8.3 km ENE of Cloudcroft S of NM-244 on CR-7, Dec early 1978, *RJS 123b* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Otero Co.: Cloudcroft, *S.L. Hatch-2222* (TAES)	**14** (Soreng & Hatch 1983, count by S.L. Hatch)
Poa paucispicula Scribn. & .Merr	CANADA. Alberta:	Banff N.P., ca. 100 km N of Banff on hwy 93, E slopes of Mt. Peyto, S of Peyto Lk., N of Bow Lk., 28 Jul 1980, *RJS & RWS 1016* (US)	**42** (Soreng & Hatch 1983, reported as *Poa leptocoma*)
Poa piperi Hitchc.	U.S.A. California:	Del Norte Co.: Off hwy 199 0.6 km on Patrick Cr. Rd above the Middle Fork of the Smith Rv., 2 Jun 1986, *RJS 2950*	**28** (Soreng 1990, 1993, without voucher)
Poa pratensis L. subsp. *alpigena* (Lindm.) Hiitonen	U.S.A. Alaska:	(US) Nome, Jul 1983, *G.L. Stebbins A-3107!* (US)	**56+III,** original det. as *Poa arctica (new)*

TABLE 1. (continued)

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
Poa reflexa Vasey & Scribn.	U.S.A. New Mexico:	Taos Co.: Wheeler Pk. La Cal Basin, ca. 1.7 km NNW of peak, 19 Aug 1980, *RJS & RWS 1478-4* (US)	**28** (Soreng & Hatch 1983)
	Utah:	Summit Co.: Mt. Murdock E of Bald Mt. Pass, Hwy 150, 11 Aug 1980, *RJS & RWS 1336* (US)	**28** (Soreng & Hatch 1983)
	Wyoming:	Park Co.: Clay Butte Look Out., ca. 2 km W of Beartooth Lk.,8 Aug 1980, *RJS & RWS 1227* (US)	**28** (new)
	Wyoming:	Sublett Co.: S side of Little Sheep Mt., NW of Green Lakes ca. 5 km, 10 Aug 1980, *RJS & RWS 1260-3* (US)	**28** (Soreng & Hatch 1983)
Poa secunda subsp. *juncifolia* (Scribn.) Soreng	U.S.A. Nevada:	Lander Co.: Toiyabe Range, E of Austin ca. 13 km on Hwy 50, 1 Jul 1980, *RJS 821* (US)	**63** (Soreng 1991b, with partial voucher information)
Poa secunda J. Presl subsp. *secunda*	U.S.A. Montana:	Glacier Co.: Glacier N.P., Siyeh Pass Trail, 4 Aug 1980, *RJS & RWS 1135* (US)	**84–88+II** (Soreng 1991b, with partial voucher information)
Poa sierrae T. Howell	U.S.A. California:	Eldorado Co.: Deep Canyon, N. Fork of American River, E of Colfax off hwy 80 ca. 2 m, ca. 0.8 km NE of river crossing of Iowa Hill-ColfaxRd., 30 May 1986, *RJS & G.L. Stebbins 2931* (US)	ca. **58** (new)
Poa strictiramea Hitchc.	MEXICO. Chihuahua:	Sierra Madre Occidental, W of San Jose Babicora, C. El Diablo Pass, 2 km W on road to Madera, 13 Apr 1984, *RJS & RWS 2304-a* (US)	*n* = **14+I,** mitosis (Soreng 1991a, with voucher and partial location)
	Chihuahua:	dito, *RJS & RWS 2304-b* (US)	*n* = **14–15+II,** mitosis (new)
Poa supina Schrad. cv. SUPERNOVA	U.S.A. Maryland:	Cultivated from commercial seed, 2000, *RJS & J. Cayouette 5950-b* (US)	*n* = **7,** mitosis (J. Cayouette, unreported)
Poa tracyi Vasey	U.S.A. New Mexico:	Bernalillo Co.: Sandia Crest, rim N of Tram, 16 Jul 1981, *RJS & K. Gadzia 1642* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Colfax Co.: WNW of Raton, Raton City Park, 16 Aug 1978, *RJS & S.L. Hatch 64* (US)	**28** (Soreng & Hatch 1983)

TABLE 1. (continued)

Taxon	County & State	Specific location, date, collection no. & herbarium	Chromosome no. (2*n*), and notes
	New Mexico:	Colfax Co.: NW of Raton, Raton City Park, 31 May 1979, *RJS 266* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Colfax Co.: N of Raton, John Mayer's Ranch, down canyon from Raton Pass on side of Bartlet Mesa, E side of US-25, 31 May 1979, *RJS 267* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Colfax Co.: Raton Ranch, NW of Raton ca. 7.5 km, 3 Jun 1979, *RJS 272* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Colfax Co.: Raton Ranch, NW of Raton ca. 12 km, 3 Jun 1979, *RJS 274* (US)	**28** (Soreng & Hatch 1983)
	New Mexico:	Lincoln Co. Sierra Blanca, circ below the Peak, 10 Jul 1982, *RJS & RWS 2007* (US)	**28+I** (new)
Poa unilateralis subsp. *pachypholis* (Piper) Soreng	U.S.A. Washington:	Pacific Co.: Ilwaco, *RWS & D. Southerland 1522A* (NMC)	**42,** R.W. Spellenberg count (Soreng 1998, with partial voucher information)
Poa unilateralis Scribn. subsp. *unilateralis*	U.S.A. Oregon:	Curry Co.: 3.3 km S of Gold Beach on serpentine road cut, Buena Vista Waysides, 300 ft above the ocean, 22 Jun 1949, *J. Clausen 2151* (CAS)	**84,** as *Poa unilateralis*, J. Clausen unpublished (Soreng 1991a, with voucher but no location)

information in Soreng (1985, 1990, 1991a, 1991b, 1993, 1998) and Soreng and Hatch (1983). Table 1 includes full specimen citations and herbaria (acronyms following Holmgren et al. 1990) where the vouchers are deposited for all of my previous and new reports. My own counts were done between 1978 and 1988. Methods for the chromosome preparations were given in Soreng and Hatch (1983).

In addition, vouchers and/or notes of a few counts done by other botanists/authors that have not been reported previously are included. Jacques Cayouette provided his new chromosome count of *P. supina* from the recently introduced (in North America) cultivar SUPERNOVA. The count reported in Soreng (1991a) for *P. lettermanii* was mentioned to me in a letter by A. Löve, ca. 1982. This report is interesting as it raises to three the number of diploid species in the New World (the others are *P. occidentalis* and *P. pseudoabbreviata*). Verification of the count for *P. lettermanii* is needed since I only have the correspondence record. I found an unpublished report for *P. unilateralis* subsp. *unilateralis* of $2n = 84$ on a herbarium specimen at CAS, the count likely done by the collector of the specimen, geneticist Jens Clausen. Myers (1947) reported a count by Stebbins of $2n = 42$, presumably for the typical subspecies (as *P. unilateralis* subsp. *pachypholis* is rather local, more recently published, and restricted to the coast of NW Oregon and adjacent Washington). Richard W. Spellenberg made a count of $2n = 42$ for *P. unilateralis* subsp. *pachypholis*.

Although emphasis has switched away from cytogenetic comparisons of species to DNA analyses in *Poa* (Gillespie & Soreng 2005; Soreng 1990), it is important to have an understanding of the cytogenetic history of taxa in order to interpret results of other analyses, and to be able to locate vouchers and know where they were collected. Of the 66 counts listed in Table 1, 34 are unreported elsewhere. The base chromosome number in the genus *Poa* is $x = 7$, and the counts reported here generally correspond to multiples of seven, but unbalanced sets of chromosomes were frequently encountered. Roman numerals given after numbers (i.e.; $2n = 28$+II) represent unpaired chromosomes in the metaphase or anaphase of meiosis, or unbalanced numbers in mitosis or later stages of meiosis. Although supernumary or B chromosomes have been reported frequently in *Poa*, no attempt was made to distinguish unbalanced chromotin of this type from fragments resulting from irregular meiosis, etc. Most of the counts reported here conform to numbers reported by other authors for the same taxa. *Poa sierrae* ($2n = 28$) is the only taxon reported here for the first time. In taxa with previously reported counts, other than my own, and disregarding the extra chromotin, the only the previously unrecorded numbers in any taxon reported here are; $2n = 56$ in *P. fendleriana* subsp. *albescens*, and $2n = 48$, 48–50, 54–56, and ca. 100 in *P. glauca* subsp. *rupicola*. This work continues to show the pattern in *Poa* of few diploid taxa, numerous taxa with low, fairly stable tetra- and hexaploid numbers, other taxa with higher eupolyploid series, and taxa

with eupolyploid peaks connected by dysploid series of numbers (Hiesey & Nobs 1982; Stebbins 1950).

ACKNOWLEDGMENTS

Most of these chromosome counts were done durning my Masters degree research under Stephen L. Hatch and then Kelly W. Allred, and PhD reseach under Richard W. Spellenberg, at New Mexico State University. My appreciation is extended to these advisors, to Gerrit Davidse and Lynn J. Gillespie for their helpful reviews of the manuscript, and to Jacques Cayouette for allowing me to report his new chromosome count.

REFERENCES

Gillespie, L.J. and R.J. Soreng. 2005. A phylogenetic analysis of the bluegrass genus *Poa* based on cpDNA restriction sited data. Syst. Bot. 30:84–105.

Hiesey, W.M. and M.A. Nobs. 1982. Experimental studies on the nature of species VI: Interspecific hybrid derivatives between facultatively apomictic species of bluegrasses and their responses to contrasting environments. Publications of the Carnegie Institute of Washingon. Vol. 636.

Holmgren, P.K., N.H. Holmgren, and L.C. Barnett. 1990. Index herbariorum. Part I.: the herbaria of the world. New York Botanical Garden, Bronx.

Morin, N.R. et al. (eds.). 1993 forward. Flora of North America north of Mexico. Oxford University Press, New York.

Myers, W.M. 1947. Cytology and genetics of forage grasses. Bot. Rev. 13:319–421.

Soreng, R.J. 1985. *Poa* L. in New Mexico, with a key to middle and southern Rocky Mountain species (Poaceae). Great Basin Naturalist 45:395–422.

Soreng, R.J. 1990. Chloroplast DNA phylogenetics and biogeography in a reticulating group: study in *Poa* (Poaceae). Amer. J. Bot. 77:1383–1400.

Soreng, R.J. 1991a. Systematics of the *Poa* L., group "Epiles" (Poaceae). Syst. Bot. 16:507–528.

Soreng, R.J. 1991b. Notes on new subspecific taxa and hybrids in North American *Poa* (Poaceae). Phytologia 71:390–413.

Soreng, R.J. 1993. *Poa* L. In: J.C. Hickman, ed. The Jepson manual: higher plants of California. University of California Press, Berkeley. Pp. 1284–1291.

Soreng, R.J. 1998. An infrageneric classification for *Poa* in North America, and other notes on sections, species, and subspecies of *Poa*, *Puccinellia*, and *Dissanthelium* (Poaceae: Poeae). Novon 8:187–202.

Soreng, R.J. and S.L. Hatch. 1983. A comparison of *Poa tracyi* and *Poa occidentalis*. Sida 10: 123–141.

Stebbins, G.L. 1950. Variation and evoluton in plants. Columbia Univeristy Press, New York.

Book Notices

University of California Press

Gary Griggs, Kiki Patsch, and Lauret Savoy. 2005. **Living with the Changing California Coast.** (ISBN 0-520-24447-8, pbk.). University of California Press, Berkeley, CA 94704, U.S.A (**Orders:** California Princeton Fulfillment Services, 1445 Lower Ferry Road, Ewing, NJ 08618, U.S.A., 609-883-1759, 609-883-7413 fax; www.ucpress.edu). $24.95, 540 pp., b/w photographs, 6" × 9".

The first edition of this book titled *Living with the California Coast*, was published in 1985. In the author's words, the first part of the book provides the reader "with some basic background on how the shoreline works, the processes and hazards that occur here, things to consider before buying or building, options in hazardous locations, and how policies and legislation influence our response." In the second part of the book, "the authors and coastal geologists familiar with specific regions describe these individual areas [coastline areas from the Oregon border to Mexico], including what we know about their geology, hazards, and histories."

Norman Myers and Jennifer Kent (eds.). Foreword by Edward O. Wilson. 2005. **The New Atlas of Planet Management.** (ISBN 0-520-23879-6, pbk.). University of California Press, Berkeley, CA 94704, U.S.A (**Orders:** California Princeton Fulfillment Services, 1445 Lower Ferry Road, Ewing, NJ 08618, U.S.A., 609-883-1759, 609-883-7413 fax; www.ucpress.edu). $39.95, 304 pp., color photos, graphs, drawings, 9 1/4" × 12 1/2".

Authors' comments about this book.—"This is no ordinary atlas. It maps and analyses a living planet at a critical point in its history—as one species, own, threatens to disrupt and exhaust its life-support systems. It charts the growing division in the human family. And it proposes that we have the chance to redirect our course, and become caretakers of our future.

The New Atlas of Planet Management is a first approach to this challenging task. It organizes the mass of available environmental data, statistical predictions, and other conflicting opinions and solutions into a simple, coherent structure. It is divided into seven sections: Land, Oceans, Elements, Evolution, Humankind, Civilization, and Management; each of these is considered from three perspectives: Potential resources, Crises, and Management alternatives.

This structure enables us to examine any critical area of concern and to weigh up: first, what it has to offer; second, where, how, and why things are obviously going wrong; and third, how we might set about putting things right, by applying a range of alternative strategies.

More than a structure for a book, this analytical formula offers one possible approach to planet management. We hope it will spur the rising global debate on our future prospects."—*Norman Myers and Jennifer Kent.*

This book is extremely well-illustrated with extensive captions describing the issues, the resources, the crises or even possible solutions.