

Table S1. Five *Picea* species data from field survey and Chinese Virtual Herbarium (CVH; [www.cvh.org.cn](http://www.cvh.org.cn))

<i>Picea</i> species	Longitude	Latitude	Data sources
Sp1	101.932221	35.27123	field survey
Sp1	101.931083	35.246176	field survey
Sp1	101.932542	35.190701	field survey
Sp1	101.935569	35.194051	field survey
Sp1	101.938583	35.185008	field survey
Sp1	101.938924	35.195435	field survey
Sp1	101.939014	35.312597	field survey
Sp1	101.942646	35.207988	field survey
Sp1	101.9427	35.197782	field survey
Sp1	101.946634	35.234758	field survey
Sp1	101.947284	35.230646	field survey
Sp1	101.947711	35.186402	field survey
Sp1	101.949859	35.219063	field survey
Sp1	101.951892	35.218272	field survey
Sp1	101.952456	35.18671	field survey
Sp1	101.952864	35.230608	field survey
Sp1	101.95429	35.212265	field survey
Sp1	101.955497	35.22449	field survey
Sp1	101.957221	35.188048	field survey
Sp1	102.0044444	29.57333333	field survey
Sp1	102.005	29.57305556	field survey
Sp1	102.0375	29.57361111	field survey
Sp1	102.0513889	29.82805556	field survey
Sp1	102.0558333	29.82361111	field survey
Sp1	102.0580556	29.81361111	field survey
Sp1	102.0597222	29.78055556	field survey
Sp1	102.0605556	29.80638889	field survey
Sp1	102.0616667	29.79361111	field survey
Sp1	102.0622222	29.79444444	field survey
Sp1	102.0630556	29.79944444	field survey
Sp1	103.2952778	30.68388889	field survey
Sp1	104.9191667	29.08944444	field survey
Sp2	100.800554	32.784968	field survey
Sp2	100.844536	32.795453	field survey
Sp2	100.844639	32.794811	field survey
Sp2	100.844747	32.794897	field survey
Sp2	100.850525	32.802019	field survey
Sp2	100.85125	32.804594	field survey
Sp2	100.868769	32.706933	field survey
Sp2	100.868909	32.706933	field survey
Sp2	100.868924	32.706953	field survey

---

Sp2	100.868943	32.706989	field survey
Sp2	100.868943	32.706941	field survey
Sp2	100.869317	32.825353	field survey
Sp2	100.883544	32.843703	field survey
Sp2	100.906669	32.734606	field survey
Sp2	101.939014	35.312597	field survey
Sp1	-123.25081	49.25408	CVH
Sp1	-73.643611	40.807222	CVH
Sp1	0.50947	51.04673	CVH
Sp1	0.62513	42.7322	CVH
Sp1	2.26684	48.74632	CVH
Sp1	4.315555	50.86	CVH
Sp1	4.49701	52.160114	CVH
Sp1	90.616667	27.516667	CVH
Sp1	90.85	27.45	CVH
Sp1	90.866452	28.39163462	CVH
Sp1	90.866667	27.45	CVH
Sp1	90.933333	27.416667	CVH
Sp1	91.17144987	28.0867245	CVH
Sp1	91.79900801	27.888221	CVH
Sp1	91.96375006	27.99700427	CVH
Sp1	94.36805829	29.65404218	CVH
Sp1	95.77390012	29.86506009	CVH
Sp1	95.78329492	29.81903179	CVH
Sp1	97.47326975	28.66744414	CVH
Sp1	98.49759504	25.02661686	CVH
Sp1	98.50775	27.78312	CVH
Sp1	98.515	27.714444	CVH
Sp1	98.528611	27.789444	CVH
Sp1	98.529444	27.789444	CVH
Sp1	98.5347	27.7903	CVH
Sp1	98.534722	27.790556	CVH
Sp1	98.539722	27.711389	CVH
Sp1	98.566111	27.770833	CVH
Sp1	98.56666	27.8	CVH
Sp1	98.593889	27.758056	CVH
Sp1	98.5975	27.6322	CVH
Sp1	98.5975	27.632222	CVH
Sp1	98.59968548	29.68578	CVH
Sp1	98.59968548	29.68577612	CVH
Sp1	98.6575	27.631944	CVH
Sp1	98.66853	27.74088	CVH
Sp1	98.67239945	27.74706788	CVH
Sp1	98.7355461	27.82295037	CVH

---

---

Sp1	98.788056	28.470833	CVH
Sp1	98.87564942	26.90805521	CVH
Sp1	98.92445	28.47009	CVH
Sp1	98.92445266	28.47008601	CVH
Sp1	99.266667	28.1	CVH
Sp1	99.29346569	27.1831702	CVH
Sp1	99.29347	27.18317	CVH
Sp1	99.37741602	25.89194507	CVH
Sp1	99.42328467	26.4592079	CVH
Sp1	99.6	27.85	CVH
Sp1	99.63383	26.19489	CVH
Sp1	99.706013	27.82308	CVH
Sp1	99.70744457	27.83576013	CVH
Sp1	99.70953	27.82518	CVH
Sp1	99.722222	27.8	CVH
Sp1	99.766529	29.236023	CVH
Sp1	99.83991312	28.26407348	CVH
Sp1	100.166944	27.003611	CVH
Sp1	100.229945	26.876096	CVH
Sp1	100.2324645	26.86065744	CVH
Sp1	100.2755746	30.00003062	CVH
Sp1	100.7436046	32.93850393	CVH
Sp1	100.8385	24.45186	CVH
Sp1	101.5134157	29.0064319	CVH
Sp1	101.5154291	27.42815487	CVH
Sp1	101.67	30.02	CVH
Sp1	101.8	30.9	CVH
Sp1	101.8872792	29.59938177	CVH
Sp1	101.916	29.68	CVH
Sp1	101.96	30.05	CVH
Sp1	101.9635552	30.00440738	CVH
Sp1	101.96483	30.055305	CVH
Sp1	102.0619444	29.77722222	CVH
Sp1	102.0622222	29.79444444	CVH
Sp1	102.065228	29.58762898	CVH
Sp1	102.088669	29.688761	CVH
Sp1	102.0951869	29.69474179	CVH
Sp1	102.17	28.54	CVH
Sp1	102.1835746	28.55529445	CVH
Sp1	102.197601	29.705801	CVH
Sp1	102.234618	29.914155	CVH
Sp1	102.2414321	29.92040166	CVH
Sp1	102.2735027	27.8877523	CVH
Sp1	102.28	26.9	CVH

---

---

Sp1	102.35	29.22	CVH
Sp1	102.359458	29.22787	CVH
Sp1	102.3664045	29.23430488	CVH
Sp1	102.366405	29.234305	CVH
Sp1	102.3694264	31.0022087	CVH
Sp1	102.4825	31.7992	CVH
Sp1	102.5144745	28.64582756	CVH
Sp1	102.54	30.91	CVH
Sp1	102.546111	30.911944	CVH
Sp1	102.5506152	32.79660528	CVH
Sp1	102.75	30.06	CVH
Sp1	102.758313	30.066708	CVH
Sp1	102.7645302	30.07247295	CVH
Sp1	102.8025	30.38173	CVH
Sp1	102.81	30.36	CVH
Sp1	102.81464	30.368117	CVH
Sp1	102.8214842	30.37408211	CVH
Sp1	102.8214842	30.07247295	CVH
Sp1	102.8363896	36.3255614	CVH
Sp1	102.8534355	29.79919351	CVH
Sp1	102.961829	33.57587	CVH
Sp1	102.9743907	33.58437665	CVH
Sp1	103	30	CVH
Sp1	103.016667	30.016667	CVH
Sp1	103.033333	30.016667	CVH
Sp1	103.0531836	30.9678997	CVH
Sp1	103.08	30.83	CVH
Sp1	103.1385858	28.33401962	CVH
Sp1	103.148639	29.160369	CVH
Sp1	103.1735114	31.44255044	CVH
Sp1	103.26	31.08	CVH
Sp1	103.267	31.084	CVH
Sp1	103.2685773	29.23608911	CVH
Sp1	103.33	31.22	CVH
Sp1	103.35	34.69	CVH
Sp1	103.3605333	34.69863941	CVH
Sp1	103.39	29.49	CVH
Sp1	103.45	28.82	CVH
Sp1	103.4915456	29.60697553	CVH
Sp1	103.517	31.375	CVH
Sp1	103.54277	28.84027	CVH
Sp1	103.571742	28.262715	CVH
Sp1	103.5784287	28.26895062	CVH
Sp1	103.59025	31.47677	CVH

---

---

Sp1	103.5965179	31.48300532	CVH
Sp1	103.59895	32.637983	CVH
Sp1	103.6105797	32.66179656	CVH
Sp1	103.612264	30.996299	CVH
Sp1	103.627971	36.088454	CVH
Sp1	103.6345801	36.09410937	CVH
Sp1	103.6345801	36.0941094	CVH
Sp1	103.6535336	30.99425689	CVH
Sp1	103.6794334	30.63659589	CVH
Sp1	103.853481	31.68115	CVH
Sp1	103.8595898	31.6868094	CVH
Sp1	103.8656011	35.40058704	CVH
Sp1	103.891767	36.519977	CVH
Sp1	104.23	33.26	CVH
Sp1	104.2495467	33.25759151	CVH
Sp1	104.37749	33.79081497	CVH
Sp1	104.37749	36.06546489	CVH
Sp1	104.5354215	32.41468198	CVH
Sp1	104.55	32.44	CVH
Sp1	104.553645	32.445845	CVH
Sp1	104.683377	32.943816	CVH
Sp1	104.6895584	32.94960128	CVH
Sp1	105.238187	32.584256	CVH
Sp1	105.2454071	32.58161686	CVH
Sp1	106.5225578	33.91658302	CVH
Sp1	108.314391	33.31033	CVH
Sp1	108.320564	33.31655549	CVH
Sp1	108.6	31.95	CVH
Sp1	108.62	31.82	CVH
Sp1	108.664	31.947	CVH
Sp1	108.664	31.952	CVH
Sp1	108.66426	31.9477	CVH
Sp1	108.6716116	31.95339075	CVH
Sp1	108.73139	31.88445	CVH
Sp1	108.9086154	32.31288078	CVH
Sp1	109.36	32.38	CVH
Sp1	109.3685467	32.39480412	CVH
Sp1	109.479425	30.295026	CVH
Sp1	109.4865503	30.30103714	CVH
Sp1	110.34	31.04	CVH
Sp1	110.340757	31.042327	CVH
Sp1	110.3475753	31.04806425	CVH
Sp1	110.6061364	31.7863978	CVH
Sp1	110.7534461	31.35446352	CVH

---

---

Sp1	110.78	31.33	CVH
Sp1	110.783719	31.331599	CVH
Sp1	111.28723	30.69348	CVH
Sp1	111.6224267	33.79182246	CVH
Sp1	111.8554253	33.05120311	CVH
Sp1	112.540918	32.999082	CVH
Sp1	112.914434	33.74487886	CVH
Sp1	113.166529	30.663372	CVH
Sp1	113.6041079	39.01503609	CVH
Sp1	113.987	22.54995	CVH
Sp1	114.075031	32.123274	CVH
Sp1	115.99	29.61	CVH
Sp1	115.994452	29.55227598	CVH
Sp1	116.0075349	29.71134056	CVH
Sp1	116.0514259	29.45453917	CVH
Sp1	117.1422876	39.22902269	CVH
Sp1	120.675	24.12404	CVH
Sp1	126.886927	54.095105	CVH
Sp1	127.076111	53.992281	CVH
Sp1	127.390357	53.863534	CVH
Sp1	129.15	56.866667	CVH
Sp1	129.338092	51.966422	CVH
Sp1	130.033333	53.816667	CVH
Sp1	130.733333	55.65	CVH
Sp1	132.453798	43.651652	CVH
Sp1	132.801128	48.836966	CVH
Sp1	132.930431	43.889936	CVH
Sp1	132.952943	43.743827	CVH
Sp1	133.808054	42.863697	CVH
Sp1	133.96091	55.80631	CVH
Sp1	134.058008	43.18613	CVH
Sp1	134.10312	43.113388	CVH
Sp1	134.11548	43.109091	CVH
Sp1	134.14507	43.678347	CVH
Sp1	134.3	52.133333	CVH
Sp1	134.416667	51.516667	CVH
Sp1	134.416667	51.883333	CVH
Sp1	134.416667	52.116667	CVH
Sp1	134.43532	43.734121	CVH
Sp1	134.5	51.7	CVH
Sp1	134.516667	51.883333	CVH
Sp1	134.65	51.61666	CVH
Sp1	134.85	52	CVH
Sp1	134.866667	52.066667	CVH

---

---

Sp1	134.875	52.066667	CVH
Sp1	135.085659	44.426057	CVH
Sp1	135.572529	54.594842	CVH
Sp1	138.171077	56.464767	CVH
Sp1	140.721179	53.133348	CVH
Sp1	141.9621	53.45925	CVH
Sp1	145.583611	43.915207	CVH
Sp1	158.006104	54.17701	CVH
Sp1	159.672203	55.441674	CVH
Sp1	159.7649	55.642918	CVH
Sp1	159.869957	56.049609	CVH
Sp1	161.026268	56.958642	CVH
Sp2	2.26684	48.74632	CVH
Sp2	90.82	28.2	CVH
Sp2	90.866452	28.39163462	CVH
Sp2	91.79900801	27.88822101	CVH
Sp2	91.96375006	27.99700427	CVH
Sp2	95.76	29.85	CVH
Sp2	95.77390012	29.86506009	CVH
Sp2	95.78329492	29.81903179	CVH
Sp2	97.46	28.66	CVH
Sp2	97.47326975	28.66744414	CVH
Sp2	98.4089	27.8806	CVH
Sp2	98.490007	25.020615	CVH
Sp2	98.49759504	25.02661686	CVH
Sp2	98.50774662	27.78311614	CVH
Sp2	98.529333	27.789556	CVH
Sp2	98.59968548	29.68577612	CVH
Sp2	98.66582	27.740736	CVH
Sp2	98.666667	26	CVH
Sp2	98.666667	28	CVH
Sp2	98.666667	28.333333	CVH
Sp2	98.72796063	28.32260339	CVH
Sp2	98.7355461	27.82295037	CVH
Sp2	98.78916	28.39	CVH
Sp2	98.7925	28.38972	CVH
Sp2	98.866667	27.1	CVH
Sp2	98.866667	27.833333	CVH
Sp2	98.87666	28.53388	CVH
Sp2	98.87916	28.53722	CVH
Sp2	98.911543	28.48611	CVH
Sp2	98.92445266	28.47008601	CVH
Sp2	98.933333	27.5	CVH
Sp2	98.933333	28.583333	CVH

---

---

Sp2	99.28	28.71	CVH
Sp2	99.28717	27.177166	CVH
Sp2	99.2929842	28.71878005	CVH
Sp2	99.29346569	27.1831702	CVH
Sp2	99.371048	25.885664	CVH
Sp2	99.416689	26.453601	CVH
Sp2	99.42328467	26.4592079	CVH
Sp2	99.633333	27.2	CVH
Sp2	99.666667	26.666667	CVH
Sp2	99.706013	27.82308	CVH
Sp2	99.70744457	27.83576013	CVH
Sp2	99.70952999	27.82518468	CVH
Sp2	99.79	28.93	CVH
Sp2	99.9	25.5	CVH
Sp2	99.9	25.6	CVH
Sp2	100.188847	26.952653	CVH
Sp2	100.229945	26.876096	CVH
Sp2	100.2324645	26.86065744	CVH
Sp2	100.3044616	29.04312156	CVH
Sp2	100.709787	24.615701	CVH
Sp2	100.883544	32.843703	CVH
Sp2	100.901911	32.716881	CVH
Sp2	101.279419	27.928607	CVH
Sp2	101.286397	27.93459856	CVH
Sp2	101.3	27.833333	CVH
Sp2	101.52	27.43	CVH
Sp2	101.666667	27.5	CVH
Sp2	101.855074	26.683211	CVH
Sp2	101.8604985	26.68876748	CVH
Sp2	101.8788828	29.21117699	CVH
Sp2	101.96483	30.055305	CVH
Sp2	102.03	30.05	CVH
Sp2	102.05	30.05	CVH
Sp2	102.0580556	29.81361111	CVH
Sp2	102.0706104	31.48200595	CVH
Sp2	102.17	28.54	CVH
Sp2	102.1835746	28.55529445	CVH
Sp2	102.234618	29.914155	CVH
Sp2	102.2414321	29.92040166	CVH
Sp2	102.2414321	29.58762898	CVH
Sp2	102.265266	27.897245	CVH
Sp2	102.2714838	27.9005809	CVH
Sp2	102.2735027	27.8877523	CVH
Sp2	102.35	29.22	CVH

---



---

Sp2	102.359458	29.22787	CVH
Sp2	102.3664045	29.23430488	CVH
Sp2	102.4740464	24.91773479	CVH
Sp2	102.507677	28.6398	CVH
Sp2	102.5144745	28.64582756	CVH
Sp2	102.5259251	30.70134906	CVH
Sp2	102.54	30.91	CVH
Sp2	102.546111	30.911944	CVH
Sp2	102.7164161	25.05156227	CVH
Sp2	102.75	30.06	CVH
Sp2	102.758313	30.066708	CVH
Sp2	102.7645302	30.07247295	CVH
Sp2	102.81	30.36	CVH
Sp2	102.81056	30.37028	CVH
Sp2	102.81399	30.36966	CVH
Sp2	102.81453	30.36813	CVH
Sp2	102.81464	30.368117	CVH
Sp2	102.8214842	30.37408211	CVH
Sp2	103.08	29.37	CVH
Sp2	103.132181	28.328636	CVH
Sp2	103.1385858	28.33401962	CVH
Sp2	103.148639	29.160369	CVH
Sp2	103.1735114	31.44255044	CVH
Sp2	103.2343397	25.23850582	CVH
Sp2	103.248771	27.696857	CVH
Sp2	103.254549	27.70214451	CVH
Sp2	103.267	31.084	CVH
Sp2	103.2685773	29.23608911	CVH
Sp2	103.39	29.49	CVH
Sp2	103.398589	29.496119	CVH
Sp2	103.43	31.03	CVH
Sp2	103.4915456	29.60697553	CVH
Sp2	103.571742	28.262715	CVH
Sp2	103.5784287	28.26895062	CVH
Sp2	103.5965179	31.48300532	CVH
Sp2	103.891767	36.519977	CVH
Sp2	104.3615856	31.9630841	CVH
Sp2	104.37749	33.79081497	CVH
Sp2	104.5354215	32.41468198	CVH
Sp2	104.553645	32.445845	CVH
Sp2	108.6716116	31.95339075	CVH
Sp2	113.129248	34.70973379	CVH
Sp2	113.9869559	22.54994881	CVH
Sp2	114.7042432	23.73962418	CVH

---

---

Sp2	117.2584239	34.25908669	CVH
Sp2	120.6750281	24.12403697	CVH
Sp3	107.1055851	29.1634786	CVH
Sp3	87.63347321	43.7992381	CVH
Sp3	106.2596046	38.28300154	CVH
Sp3	108.2544268	33.04460211	CVH
Sp3	115.994452	29.55227598	CVH
Sp3	116.0094477	29.70981422	CVH
Sp3	97.0153764	32.99956	CVH
Sp3	96.48691827	32.20919437	CVH
Sp3	94.23124276	29.22929934	CVH
Sp3	94.21993858	29.22091654	CVH
Sp3	98.59968548	29.68577612	CVH
Sp3	93.40892438	28.85749454	CVH
Sp3	97.47326975	28.66744414	CVH
Sp3	94.36805829	29.65404218	CVH
Sp3	95.77390012	29.86506009	CVH
Sp3	93.08136823	29.05190242	CVH
Sp3	96.92436045	30.05902899	CVH
Sp3	91.96375006	27.99700427	CVH
Sp3	95.78289072	29.85836103	CVH
Sp3	91.12399287	29.65459435	CVH
Sp3	95.60264384	31.41840296	CVH
Sp3	97.17958359	31.14734655	CVH
Sp3	96.60671719	31.21779311	CVH
Sp3	96.92436	30.059029	CVH
Sp3	98.29577328	31.67779714	CVH
Sp3	97.84736683	29.67684854	CVH
Sp3	91.12434213	29.65289365	CVH
Sp3	93.2524198	29.89136762	CVH
Sp3	98.27733413	30.86596696	CVH
Sp3	91.12082392	29.65004027	CVH
Sp3	99.29346569	27.1831702	CVH
Sp3	100.2324645	26.86065744	CVH
Sp3	100.2435273	26.8273918	CVH
Sp3	99.70744457	27.83576013	CVH
Sp3	98.92445266	28.47008601	CVH
Sp3	120.6750281	24.12403697	CVH
Sp3	98.82675241	28.19735521	CVH
Sp3	113.3231761	23.12820067	CVH
Sp3	98.80672792	28.48791499	CVH
Sp3	121.8569432	31.35154796	CVH
Sp3	120.6750281	24.91773479	CVH
Sp3	120.2161811	23.01344702	CVH

---

---

Sp3	99.83991312	28.26407348	CVH
Sp3	99.37741602	25.89194507	CVH
Sp3	99.70953	27.82518	CVH
Sp3	100.0449096	27.502907	CVH
Sp3	100.8585904	27.28772783	CVH
Sp3	100.2402577	26.87864065	CVH
Sp3	101.286397	27.93459856	CVH
Sp3	102.7978161	31.67912554	CVH
Sp3	101.5134157	29.0064319	CVH
Sp3	102.3694264	31.0022087	CVH
Sp3	100.3044616	29.04312156	CVH
Sp3	99.1167267	30.01166171	CVH
Sp3	99.80505957	28.93673348	CVH
Sp3	103.1735114	31.44255	CVH
Sp3	102.0706104	31.48200595	CVH
Sp3	101.9635552	30.00440738	CVH
Sp3	101.7136097	32.90822092	CVH
Sp3	101.0205004	30.03756897	CVH
Sp3	102.7785965	28.96482319	CVH
Sp3	102.3664045	29.23430488	CVH
Sp3	99.2929842	28.71878005	CVH
Sp3	101.8964371	30.8847698	CVH
Sp3	100.2755746	30.00003062	CVH
Sp3	101.5154291	27.42815487	CVH
Sp3	102.1835746	28.55529445	CVH
Sp3	101.1315403	30.98532628	CVH
Sp3	102.8214842	30.07247295	CVH
Sp3	100.34589	28.46027605	CVH
Sp3	103.3956132	35.66932973	CVH
Sp3	100.7073622	31.54182673	CVH
Sp3	102.2135021	31.91174796	CVH
Sp3	102.8214842	30.37408211	CVH
Sp3	104.5354215	32.41468198	CVH
Sp3	100.3044616	100.3044616	CVH
Sp3	101.8872792	29.59938177	CVH
Sp3	103.0396913	29.7407859	CVH
Sp3	101.9685467	30.05527884	CVH
Sp3	107.9345709	35.50793297	CVH
Sp3	102.700013	25.012526	CVH
Sp3	100.229945	26.876096	CVH
Sp3	100.261612	27.080156	CVH
Sp3	100.349619	27.111409	CVH
Sp3	100.208	27.1681	CVH
Sp3	99.28717	27.177166	CVH

---

---

Sp3	99.4099	27.2229	CVH
Sp3	100.85195	27.2822	CVH
Sp3	101.5	27.42	CVH
Sp3	99.6851	27.6271	CVH
Sp3	99.706013	27.82308	CVH
Sp3	101.27	27.92	CVH
Sp3	101.279419	27.928607	CVH
Sp3	98.911543	28.48611	CVH
Sp3	102.17	28.54	CVH
Sp3	102.177079	28.549809	CVH
Sp3	99.28	28.71	CVH
Sp3	99.286333	28.713041	CVH
Sp3	99.79	28.93	CVH
Sp3	99.79929	28.932073	CVH
Sp3	102.771746	28.966068	CVH
Sp3	101.5	29	CVH
Sp3	101.507299	29.000343	CVH
Sp3	100.298406	29.037008	CVH
Sp3	93.07	29.04	CVH
Sp3	93.9	29.13	CVH
Sp3	102.359458	29.22787	CVH
Sp3	94.63	29.45	CVH
Sp3	94.5436	29.565	CVH
Sp3	94.5428	29.5652	CVH
Sp3	94.54	29.57	CVH
Sp3	91.12	29.65	CVH
Sp3	98.593111	29.679906	CVH
Sp3	94.7172	29.8186	CVH
Sp3	95.76	29.85	CVH
Sp3	93.24	29.88	CVH
Sp3	101.96	30.05	CVH
Sp3	96.91	30.05	CVH
Sp3	101.96483	30.055305	CVH
Sp3	101.89	30.87	CVH
Sp3	102.546111	30.911944	CVH
Sp3	102.36	30.99	CVH
Sp3	102.206261	31.905842	CVH
Sp3	96.22	32.27	CVH
Sp3	96.67	32.77	CVH
Sp3	106.253125	38.277304	CVH
Sp3	98.222222	25.543333	CVH
Sp3	98.768611	27.1725	CVH
Sp3	98.749444	27.176389	CVH
Sp3	98.5775	27.608889	CVH

---

---

Sp3	98.5975	27.632222	CVH
Sp3	98.597778	27.632222	CVH
Sp3	98.515	27.714444	CVH
Sp3	98.502222	27.715	CVH
Sp3	98.593889	27.758056	CVH
Sp3	98.578611	27.763056	CVH
Sp3	98.603333	27.765833	CVH
Sp3	98.566389	27.770833	CVH
Sp3	98.550278	27.782222	CVH
Sp3	98.529444	27.789444	CVH
Sp3	98.409	27.8807	CVH
Sp3	99.722222	27.8	CVH
Sp3	101.1	28.4	CVH
Sp3	105	35	CVH
Sp3	-90.259783	38.611233	CVH
Sp3	30.3	59.9	CVH
Sp3	102.28	26.9	CVH
Sp3	100.33	27.17	CVH
Sp3	100.179889	26.850444	CVH
Sp3	100.22775	26.85505	CVH
Sp3	100.38757	26.88533	CVH
Sp3	100	27	CVH
Sp3	100.519	27.263	CVH
Sp3	100.136111	27.382778	CVH
Sp3	100.138333	27.383056	CVH
Sp3	100.031944	27.635	CVH
Sp3	99.95	27.733889	CVH
Sp3	99.7175	27.8	CVH
Sp3	99.133333	28.3	CVH
Sp3	99.766667	28.383333	CVH
Sp3	107.1	28.4	CVH
Sp3	98.85	28.466667	CVH
Sp3	99.75	28.95	CVH
Sp3	101.95715	29.99844	CVH
Sp3	103	30	CVH
Sp3	100	30	CVH
Sp3	101.955	30.012	CVH
Sp3	101.96514	30.02742	CVH
Sp3	101.96028	30.05111	CVH
Sp3	104.07593	30.65165	CVH
Sp3	102	31	CVH
Sp3	0.62513	42.7322	CVH
Sp3	-123.25081	49.25408	CVH
Sp3	100.259167	27.072778	CVH

---

---

Sp3	100.244361	28.517181	CVH
Sp3	100.4975	29.734722	CVH
Sp3	100.497611	29.734806	CVH
Sp3	99.8545	29.846889	CVH
Sp3	99.854444	29.846944	CVH
Sp3	100.813583	30.031528	CVH
Sp3	100.813611	30.031667	CVH
Sp3	175.966851	-39.881593	CVH
Sp3	93.9	29.03	CVH
Sp3	93.93	29.05	CVH
Sp3	94.92	29.58	CVH
Sp3	93.93	30	CVH
Sp3	98.810556	28.383611	CVH
Sp4	123.4710966	41.68383	CVH
Sp4	109.5764026	31.40488	CVH
Sp4	98.92445266	28.47009	CVH
Sp4	99.70744457	27.83576013	CVH
Sp4	97.0153764	32.99956	CVH
Sp4	100.7436046	32.9385	CVH
Sp4	94.7488939	29.94242862	CVH
Sp4	98.59968548	29.68578	CVH
Sp4	97.84736683	29.67684854	CVH
Sp4	97.17958359	31.14734655	CVH
Sp4	98.22459452	31.50521	CVH
Sp4	97.57512368	30.65986	CVH
Sp4	96.92436045	30.05903	CVH
Sp4	97.47326975	28.66744	CVH
Sp4	93.79217296	31.89242	CVH
Sp4	95.83130661	30.74713	CVH
Sp4	93.68596594	31.48636	CVH
Sp4	98.27733413	30.86597	CVH
Sp4	97.47326975	29.65289	CVH
Sp4	91.12399287	29.65459	CVH
Sp4	94.36805829	29.65404218	CVH
Sp4	96.60671719	31.21779	CVH
Sp4	101.4355918	29.05206	CVH
Sp4	101.4118363	29.16047	CVH
Sp4	99.80505957	28.93673348	CVH
Sp4	101.5134157	29.00643	CVH
Sp4	100.3183982	30.94547	CVH
Sp4	100.9855835	32.27109	CVH
Sp4	102.3694264	31.00221	CVH
Sp4	100.6823969	31.39799	CVH
Sp4	100.3394136	32.27433	CVH

---

---

Sp4	98.58740161	31.81211	CVH
Sp4	101.0205004	30.03757	CVH
Sp4	103.1735114	31.44255	CVH
Sp4	102.3664045	29.2343	CVH
Sp4	101.9635552	30.00441	CVH
Sp4	100.2755746	30.00003	CVH
Sp4	98.83110022	31.21531	CVH
Sp4	101.1315403	30.98532628	CVH
Sp4	101.8964371	30.88477	CVH
Sp4	100.3044616	29.04312	CVH
Sp4	98.10948062	32.984	CVH
Sp4	99.1167267	30.01166	CVH
Sp4	102.9965174	32.06781	CVH
Sp4	99.99921035	31.62896	CVH
Sp4	101.5154291	27.42815	CVH
Sp4	102.0706104	31.48201	CVH
Sp4	100.34589	28.46027605	CVH
Sp4	102.8214842	30.37408	CVH
Sp4	102.5506152	32.79661	CVH
Sp4	98.109481	32.984003	CVH
Sp4	101.0205004	30.00441	CVH
Sp4	104.0815335	30.65582	CVH
Sp4	103.3956132	35.66933	CVH
Sp4	101.7136097	32.90822	CVH
Sp4	103.8595898	31.68681	CVH
Sp4	101.8872792	29.59938	CVH
Sp4	117.184954	40.283223	CVH
Sp4	107.9345709	35.50793	CVH
Sp4	104.2495467	33.25759	CVH
Sp4	101.286397	27.9346	CVH
Sp4	101.9685467	30.05528	CVH
Sp4	100.8294994	31.19334	CVH
Sp4	102.2135021	31.91175	CVH
Sp4	101.507299	29.000343	CVH
Sp4	100.298406	29.037008	CVH
Sp4	98.6728	29.2739	CVH
Sp4	101.96483	30.055305	CVH
Sp4	101.125234	30.979541	CVH
Sp4	98.580912	31.80612	CVH
Sp4	102.990174	32.061655	CVH
Sp4	96.67	32.77	CVH
Sp4	101.96191	30.02422	CVH
Sp4	100.33	27.17	CVH
Sp4	99.63	27.9	CVH

---

---

Sp4	101.22	28.9	CVH
Sp4	101.52	29.4	CVH
Sp4	101.43	29.4	CVH
Sp4	102.05	30.05	CVH
Sp4	102.03	30.05	CVH
Sp4	101.63	30.3	CVH
Sp4	101.72	30.32	CVH
Sp4	100.157222	29.14	CVH
Sp4	99.928333	29.141111	CVH
Sp4	100.08222	29.28028	CVH
Sp4	94.775056	29.771306	CVH
Sp4	101.97	29.92	CVH
Sp4	5.408055	50.956111	CVH
Sp4	100.157	29.14	CVH
Sp4	99.9283	29.1411	CVH
Sp4	96.5236	31.8753	CVH
Sp4	96.4608	31.9181	CVH
Sp4	97.2667	32.0944	CVH
Sp4	97.3472	32.7464	CVH
Sp4	100.1572	29.14	CVH
Sp4	99.706013	27.82308	CVH
Sp4	99.286333	28.713041	CVH
Sp4	99.79	28.93	CVH
Sp4	99.79929	28.932073	CVH
Sp4	98.593111	29.679906	CVH
Sp4	99.107741	30.004589	CVH
Sp4	101.014427	30.031529	CVH
Sp4	96.91	30.05	CVH
Sp4	101.865706	30.14136	CVH
Sp4	100.311366	30.93917	CVH
Sp4	102.364372	30.99903	CVH
Sp4	98.218428	31.499202	CVH
Sp4	102.206261	31.905842	CVH
Sp4	100.978754	32.265516	CVH
Sp4	102.961829	33.57587	CVH
Sp4	103.481974	30.511499	CVH
Sp4	96.523611	31.875278	CVH
Sp4	97.266667	32.094444	CVH
Sp4	97.347222	32.746389	CVH
Sp4	101.5	27.42	CVH
Sp4	101.279419	27.928607	CVH
Sp4	98.911543	28.48611	CVH
Sp4	97.46	28.66	CVH
Sp4	97.84	29.67	CVH



Sp4	100.26	29.99	CVH
Sp4	99.1	30	CVH
Sp4	101.96	30.05	CVH
Sp4	101.86	30.14	CVH
Sp4	102.81464	30.368117	CVH
Sp4	97.56	30.65	CVH
Sp4	95.82	30.74	CVH
Sp4	102.54	30.91	CVH
Sp4	102.546111	30.911944	CVH
Sp4	100.31	30.93	CVH
Sp4	102.36	30.99	CVH
Sp4	97.18	31.13	CVH
Sp4	98.82	31.21	CVH
Sp4	100.67	31.39	CVH
Sp4	93.67	31.48	CVH
Sp4	98.21	31.49	CVH
Sp4	98.58	31.8	CVH
Sp4	100.97	32.26	CVH
Sp4	99.334167	29.13806	CVH
Sp4	100.082222	29.280279	CVH
Sp4	94.979439	30.758329	CVH
Sp4	98.961113	30.98361	CVH
Sp5	108.03689	30.28898	CVH
Sp5	99.80505957	28.93673348	CVH
Sp5	100.4287392	28.80285809	CVH
Sp5	100.3044616	29.04312156	CVH
Sp5	99.2929842	28.71878005	CVH
Sp5	99.79943	28.93554	CVH
Sp5	100.34589	28.46027605	CVH
Sp5	101.2514346	27.14011329	CVH
Sp5	101.286397	27.93459856	CVH
Sp5	100.324706	28.53999398	CVH
Sp5	98.92445266	28.47008601	CVH
Sp5	99.70744457	27.83576013	CVH
Sp5	100.0788658	27.94593338	CVH
Sp5	99.83991312	28.26407348	CVH
Sp5	99.65450905	27.86037313	CVH
Sp5	120.6750281	24.12403697	CVH
Sp5	94.36805829	29.65404218	CVH
Sp5	94.21993858	29.22091654	CVH
Sp5	95.77390012	29.86506009	CVH
Sp5	92.46896552	28.414019	CVH
Sp5	97.47326975	28.66744414	CVH
Sp5	90.866452	28.39163462	CVH

Sp5	93.08136823	29.05190242	CVH
Sp5	91.96375006	27.99700427	CVH
Sp5	91.12082392	29.65004027	CVH
Sp5	95.78329492	29.81903179	CVH
Sp5	93.2524198	29.89136762	CVH
Sp5	94.65788758	29.62730603	CVH
Sp5	93.37977248	28.86645647	CVH
Sp5	96.60671719	31.21779311	CVH
Sp5	99.707778	28.008889	CVH
Sp5	99.760833	28.327222	CVH
Sp5	94	29	CVH
Sp5	93.783333	29	CVH
Sp5	99.706013	27.82308	CVH
Sp5	90.82	28.2	CVH
Sp5	98.911543	28.48611	CVH
Sp5	97.46	28.66	CVH
Sp5	99.28	28.71	CVH
Sp5	99.79	28.93	CVH
Sp5	93.07	29.04	CVH
Sp5	94.36	29.63	CVH
Sp5	91.12	29.65	CVH
Sp5	95.76	29.85	CVH
Sp5	93.24	29.88	CVH
Sp5	107.890946	30.317053	CVH
Sp5	0.447668	51.072846	CVH
Sp5	98.78916	28.39	CVH
Sp5	88.9	27.466667	CVH
Sp5	93.9	29.133333	CVH
Sp5	94.633333	29.45	CVH
Sp5	94.916667	29.633333	CVH

---

The codes of nature reserves with high probability of potential distribution of five *Picea* species under current and predicted climate.

Sp1: *P. brachytyla*; Sp2: *P. brachytyla* var. *comparata*; Sp3: *P. likiangensis*; Sp4: *P. likiangensis* var. *rubescens*; Sp5: *P. likiangensis* var. *linzhiensis*.

Table S2. The predicted distribution area of *Picea* species under the current climate and the future climate of the two emission scenarios.

Code	Nature reserves	Current	ssp2-4.5	ssp5-8.5
4	Ji'an	0	0	1
6	Dabie Mountain, Henan	1	0	0
7	Dasha River	3	3	2
11	Gujing Garden	1	1	1
12	Fujian Emei peak	1	0	0
13	Dalaoling	2	2	2
14	Mapan yongcuo wetland	2	2	2
15	Duoer	6	6	6
16	Buddha top mountain	1	1	0
17	Gao Leshan	1	1	1
20	Louzi mountain, Liaoning	0	0	1
21	Medica wetland	8	8	8
28	Nanhe	3	3	3
29	Ting Jiangyuan	1	0	0
33	Yunkai Mountain	2	2	0
34	Thousand Buddhas Mountain	1	1	1
35	Nanhua mountain	2	2	2
37	Cymbal mountain	2	1	0
38	Taikuan River	2	2	2
39	Qinglong River	0	0	1
40	Southerly side	2	2	0
41	Changyang bengjianzi	2	2	2
42	Wudaoxia	4	4	4
43	Motianling, Shaanxi	1	1	1
49	Five flower top	0	0	1
51	Namoga wetland	3	3	3
58	Dabie Mountains	1	0	0
59	Padang golden monkey	1	1	1
63	Baihe	2	2	2
66	Gu Niujiang	1	1	0
67	Jinzhai Tianma	6	6	6
71	Yaoluoping	2	1	1
72	White Horse Snow Mountain	29	29	29
73	Beijing Songshan	0	0	1
74	Cangshan Erhai Lake	9	9	6
76	Huboliao	1	1	0
78	Liang Yeshan	2	2	0
79	Jiangle Longqi Mountain	2	2	0
80	Plum blossom mountain	3	3	0
82	Tianbaoyan	1	1	0

83	Wuyishan, Fujian	7	4	0
84	Rare marine species in Xiamen	1	1	0
86	Annan dam Wild Camel	0	0	39
87	Baishuijiang	27	27	27
89	Gahai zecha	5	5	5
90	Liancheng	5	5	5
92	Lianhua Mountain, Gansu	2	2	2
93	Taitong Kongtong mountain	2	2	2
94	Xiaolongshan	4	4	4
95	Yanchi Bay	0	0	20
96	Gaoligong Mountain	50	50	44
97	Chebaling	1	1	0
102	Nanling	6	4	0
103	Xiangtou Mountain	1	0	0
107	Cenwanglao mountain	3	3	0
108	Dayaoshan	1	0	0
111	Huaping	1	1	0
112	Jinzhong mountain black necked long tailed pheasant	3	3	0
113	Jiuwanshan	3	3	0
114	Maoer Mountain	1	0	0
115	Munlun	1	1	0
117	Qianjiadong	1	1	0
119	Shiwan Mountain	3	0	0
121	Alsophila spinulosa	1	1	0
122	Fanjing Mountain	7	6	5
123	Wide water	4	4	4
124	Lei Gongshan	7	7	2
125	Ma-yangHo	3	3	0
126	Maolan	2	2	0
127	Subtropical evergreen broad-leaved forest in Xishui	7	7	5
139	Changli Gold Coast	0	0	1
140	Geological relics of Liujiang Basin	0	1	1
141	Maojing dam	0	0	1
143	Saihan dam	0	0	1
144	Wuling Mountain, Hebei	0	0	1
145	Xiaowutai Mountain	0	1	4
146	Bao Tianman	1	1	1
147	Danjiang wetland	5	5	5
148	Dong Zhai	4	0	0
149	Funiu Mountain	9	9	9
151	Liankang mountain	1	0	0
152	macaca mulatta	9	9	9
153	Xiaoqinling	1	1	1
173	Wufenghou River	7	7	7

174	Jiugong Mountain	1	1	0
176	Seven sisters mountain	4	4	4
178	Shennongjia	10	10	10
179	Xingdou Mountain	9	9	9
180	badagongshan mountain	4	4	2
181	Bamianshan	1	1	0
183	Huping mountain	9	9	4
185	Mangshan	3	2	0
187	Yanling Taoyuan cave	1	1	0
193	Jilin Changbai Mountain	0	0	2
195	Hunchun Amur tiger	1	2	6
198	Tianfo Zhishan	0	0	4
206	Jiulian Mountain	1	1	0
210	Wuyishan, Jiangxi	2	1	0
213	Dalian spotted seal	1	1	1
218	Dandong Yalu River Estuary Wetland	1	1	2
225	Daqingshan, Inner Mongolia	0	0	6
232	Heili River	0	0	2
241	Lingwu Baiji Beach	0	0	1
242	Haba Lake	0	0	6
243	Liupanshan	10	10	10
244	Luoshan, Ningxia	0	3	4
245	Shapotou	0	0	3
246	Hoh Xil	3	26	74
247	Longbao	1	1	1
248	Qinghai Lake	26	28	28
249	Sanjiangyuan	336	489	508
250	Xunhua Mengda	2	2	2
251	Binzhou shellfish island and wetland	0	0	2
256	Lishan	2	2	2
257	Luya Mountain	3	4	4
258	Pangquangou	2	2	2
259	Wulu mountain	3	3	3
260	Evergreen	6	6	6
261	Foping	4	4	4
262	Hanzhong Crested Ibis	8	8	8
263	Hualongshan	4	4	4
264	Cattle back beam	3	3	3
265	Taibai Mountain	7	7	7
266	Tianhua mountain	2	2	2
267	Zhou Zhi	6	6	6
268	Ziwuling, Shaanxi	6	6	6
271	Baishui River	5	5	5
272	Chaqingsong white lipped deer	1	1	1

273	Rare and endemic fish in the upper reaches of the Yangtze River	16	15	8
274	Changning Bamboo Sea	3	3	0
275	Fengtongzhai	4	4	4
276	Gongga Mountain	18	18	18
277	Haizi Mountain	5	5	5
278	Calyx mountain	7	7	7
279	Sketch Creek	3	3	0
280	jiuzhaigou	3	3	3
281	Longxi Hongkou	3	3	3
282	Mabian gale top	5	5	5
283	Meigu gale top	5	5	5
284	Micang mountain	4	4	4
285	Panzhihuaensis Cycas	1	1	1
286	Ruoergai wetland	18	18	18
287	Xiaojin Siguniang mountain	6	6	6
288	Tangjiahe	5	5	5
289	Wang Lang	3	3	3
290	Wolong	15	15	15
291	Xuebaoding	8	8	8
292	Aden	9	9	9
295	Chayu Ciba ditch	8	8	8
297	Mangkang Yunnan snub nosed monkey	20	20	20
298	Qiangtang	73	347	1460
299	Selincu	142	142	142
300	Yarlung Zangbo Grand Canyon	77	77	69
301	Black necked Crane in the middle reaches of Yarlung Zangbo River	19	19	19
302	Mount Qomolangma	65	65	65
303	Altun Mountain	0	4	63
308	Lop Nur Wild Camel	0	0	118
310	peak Pobedy	0	1	13
311	Ailao Mountain	2	2	2
312	Dashanbao black necked Crane	3	3	3
313	Jinpingling	4	4	2
314	Huanglianshan	7	6	0
315	Naban River Basin	3	3	0
316	Nangunhe	6	6	0
317	Wenshan	3	3	2
318	Wuliang Mountain	4	4	4
319	Xishuangbanna	12	0	0
320	Yaoshan	3	3	3
321	Yongde Snow Mountain	1	1	1
324	Fengyang mountain Baishanzu	2	2	0

326	Zhejiang Jiulongshan	1	1	0
328	Wuyanling	1	0	0
329	Daba Mountain	20	20	20
330	Jinfoshan	7	7	5
332	Camel beam	0	2	3
333	Qingya Village	3	3	3
338	Gexi ditch	4	4	4
339	Changsha Gongma	7	17	22
340	Heizhugou	7	7	7
341	Laojun Mountain	1	1	1
342	Black tea mountain	2	3	3
343	Amaryllaceae	2	2	0
344	Chongzuo white headed langur	2	0	0
346	Xuebao mountain	3	3	3
347	Yintiaoling	2	2	2
348	Hunan Shunhuangshan	1	1	1
352	Jiaozi mountain	2	2	2
353	Yunlong Tianchi	1	1	1
354	Yuanjiang	4	4	0
357	Prince Edward Hill	9	9	9
358	Taohe River	22	22	22
359	Anhui Qingliangfeng	1	1	0
360	Shimen platform	4	2	0
366	Qi Yunshan	3	0	0
367	White Wolf mountain	0	0	2
368	Saiwudang	3	3	3
370	Wood forest	2	2	2
371	Zibai mountain	3	3	3
372	Hancheng Huanglongshan Brown pheasant	5	5	5
373	Yan'an Huanglongshan Brown pheasant	12	12	12
374	Micang mountain, Shaanxi	5	5	5
375	Qingmuchuan	2	2	2
376	Mulberry garden	1	1	1
385	Upper reaches of Luanhe River	0	0	1
389	Baihua Mountain	0	1	5
390	Baxian Mountain	0	0	2
393	Helan Mountain, Inner Mongolia	0	1	10
399	Yancheng Wetland rare birds	3	0	0
401	Xiongjiang Huangchu forest	1	0	0
402	Kunyu Mountain	1	1	1
403	Nanyang dinosaur egg fossil group	20	20	20
406	Daming Mountain	1	0	0
407	Rare aquatic animals in nuoshui River	1	1	1
408	Huize black necked Crane	2	2	2

409	Wuqi like red deer	4	4	4
411	Taibaishui River	4	4	4
418	Mangdang Mountain	2	0	0
419	Ganjiang River source	1	1	0
421	Blocking the river source	5	5	5
423	White Cloud Mountain	4	2	0
424	Luokeng Crocodile Lizard	1	0	0
426	Wulipo	6	6	6
427	Xiaozhaizigou	7	7	7
428	Huangbaiyuan	1	1	1
429	Pingheliang	1	1	1
430	Rare aquatic animals in Lueyang	2	2	2
432	Qaidam Haloxylon ammodendron forest	2	33	54
433	Yunwu Mountain	1	1	1
434	Lingkong mountain	1	1	1
442	Eighteen mile long Gorge	3	3	3
444	Jiuyi mountain	1	1	0
445	Jintong mountain	3	2	0
448	Liziping	5	5	5
449	Wumeng Mountain	3	3	2
450	Old county	2	2	2
451	Guanyin Mountain	2	2	2
452	The first song of the Yellow River	21	21	21
453	Datong Beichuan river source area	3	3	3
454	Danxia landform of Huoshizhai	2	2	2
456	En City	2	0	0
457	Qilian Mountain, Gansu	57	80	112
461	Yellow River Delta	0	0	1
466	Dawei Mountain, Yunnan	8	8	0
467	Xinglong mountain	3	3	3
468	Helan Mountain	0	1	15
470	Henan Yellow River Wetland	5	5	5
471	Minjiang River source	1	0	0
472	Anxi extremely arid desert	0	0	7
478	Shaanxi Heihe rare aquatic animal reserve	17	17	17
479	Shaanxi Danfeng Wuguan River rare aquatic animal reserve	7	7	7
Total		1748	2221	3648

The numbers in columns current, ssp2-4.5 and ssp5-8.5 represent the count value of the predicted distribution of *Picea* species in the nature reserve. The larger the count value, the larger the distribution area of *Picea* species. Code represents the number of the nature reserve.