

Recommendations:

This study identified the use of calls as a useful tool to help distinguish between frogs, particularly within the *Platymantis* genus. Use of genetic techniques would enhance morphological and ecological methods in determining taxonomic status. Furthermore DNA samples and call analysis could be used non destructively and would avoid the collection of rare frogs.

From the results of this study, the following specific research and conservation priorities have been identified:

- Determine the taxonomy of
 1. The white frog
 2. *Platymantis* sp
 3. *Kaloula* sp

- Collect large samples of calls from the frogs on Polillo and compare with large samples collected on Luzon
- Carry out genetic analyses of the species on Polillo and comparable species on Luzon (particularly the aforementioned).
- Determine the wider distribution of frog species on Polillo, using calls to identify the presence of cryptic groups.
- Search for the white frog over different parts of Polillo and determine its habitat requirements.
- Assess the effects of forest fragmentation on supporting *Platymantis* sp populations

- Preserve border vegetation and trees beside streams even when in agricultural land, especially streams linking patches of forest.
- Prevent further destruction of both primary and secondary forest sites which are important habitats and may support populations of rare frog species
- Use frog call recordings as an environmental educational tool
- Conduct investigations into the reproductive ecology of the amphibian species on Polillo

REFERENCES

- Alcala,A.C. (1986). Guide to the Philippine flora and fauna: Amphibians and Reptiles. University of the Philippines 10:1-195.
- Alcala, A.C., Joermann,G., and Brzoska, J. (1986) Mating calls of certain Philippine anurans (Microhylidae, Ranidae). *Silliman Journal* **33 (1-4)**: 31-44
- Bennet-Clark,H.C., (1989). Songs and the Physics of Sound Production. *In* Huber,F., Moore,.TE., and Werner,.L. (eds.), Cricket Behaviour and Neurobiology. Cornell University Press.
- Bibby, C., Jones, M. and Marsden, S. (1998). Expedition Field Techniques; Bird surveys. Expedition Advisory Centre, Royal Geographical Society.
- Brady.L.D. (1996). U.E.A Madagascar Expedition '93 Final report.
- Brown, W.C., A.C. Alcala. (1964). Philippine frogs of the family Rhacophoridae. *Proc. Calif. Acad. Sci.* **48 (10)**: 185-220.
- Brown, W.C., A.C. Alcala, Ong,P.S. and A.C.Diesmos. (1999). A new species of *Platymantis* (Amphibia: Ranidae) from the Sierra Madre Mountains, Luzon Island, Philippines. *Proc. Biol. Soc. Washington*, **112 (3)**: 510-514
- Brown, W.C., A.C. Alcala and A.C.Diesmos. (1997). A new species of *Platymantis* (Amphibia: Ranidae) from Luzon Island, Philippines. *Proc. Biol. Soc. Washington*, **110**: 18-23.
- Brown, W.C., A.C. Alcala, A.C.Diesmos, and E.L.Alcala. (1997). Species of the *guentheri* group of *Platymantis* (Amphibia: Ranidae) from the Philippines, with descriptions of four new species. *Proc. Calif. Acad. Sci.* **50(1)**: 1-20.
- Brown, W.C., R.M.Brown, and A.C. Alcala. (1997). Species of the *Hazelae* group of *Platymantis* (Amphibia: Ranidae) from the Philippines. *Proc. Calif. Acad. Sci.* **49 (11)**: 405-421.
- Brzoska, J., Joermann,.G., and Alcala,A.C., (1986). Structure and variability of the calls of *Polypedates leucomystax* (Amphibia: Rhacophoridae) from Negros, Philippines. *Silliman Journal* **33 (1-4)**: 87-103
- Busnel,R.G., Editor. (1963). Acoustic Behaviour of Animals. Elsevier Publishing company
- Culotta,E. (1995). Ecologists flock to snowbird for varied banquet of findings. *Science* **269**: 1045-1046
- Diesmos, A.C., (1998) The amphibian faunas of Mount Banahao, Mount San Cristobal, and Mount Maquiling, Luzon Island, Philippines. Submitted thesis for Master of science.

Duellman, W.E. (1978). The biology of an equatorial herpetofauna in Amazonian Ecuador. *Miscellaneous publications of the University of Kansas Museum of Natural History* 65

Duellman, W.E., and Trueb, L., (1986). *Biology of Amphibians*. John Hopkins University Press

Fletcher, N.H., (1992). *Acoustic systems in Biology*. Oxford University Press

Gambold, N., and J.C.Z.Woinarski. (1993). Distributional patterns of herpetofauna in monsoon rainforests of the Northern Territory, Australia. *Australian Journal of Ecology* **18**: 431-449

Hambler, C., and Speight, M. R. (1995). Biodiversity conservation in Britain: Science replacing tradition. *British Wildlife* **6**: 137-147

Heyer, W.R., Donnelley, M.A.,McDiarmid, R.W., Hayek, L.C. and Foster, M.S. (eds.), (1994) *Measuring and Monitoring Biological Diversity: Standard methods for amphibians*. Smithsonian Institution.

Inger, R.F. (1954). Systematics and zoogeography of Philippine amphibia. *Fieldiana:Zool.* **33**: 181-531.

Inger, R.F. & Vorris, H.K. (1993) A comparison of amphibian communities through time and from place to place in Bornean forests. *J.Trop. Ecol.* **9**: 409-33

Krebs,C.J. (1999) *Ecological Methodology*. Second edition. Addison-Welsey Educational Publishers, Inc. Benjamin/Cummings.

Parris, K.M. and M.A.McCarthy. (1999). What Influences the structure of frog assemblages at forest streams? *Australian Journal of Ecology* **24**: 495-502

Laake,J.L., Buckland,S.T., Anderson,D.R. and Burnham,K.P. (1993). *DISTANCE User's Guide*. Colorado cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, CO 80523, USA

Olding,P., (1998). The diversity of the Advertisement call structure found in the Microhylidae of Australia. PhD thesis

Pearman,P.B. (1997). Correlates of Amphibian Diversity in an altered Landscape of Amazonian Ecuador. *Conservation Biology*. **11**; 1211-1225

Sinsch,U. (1990). Migration and orientation in anuran amphibians. *Ethology, Ecology and Evolution* **2**: 65-79

Taylor, Edward H. (1922). Additions to the Herpetological Fauna of the Philippine Islands. I. *Philip. Jour. Sci.*, **21**: 161-206, 7pls.

Taylor, Edward H. (1922). Additions to the Herpetological Fauna of the Philippine Islands. II. *Philip. Jour. Sci.*, **21**: 257-303, 4 pls.

Taylor, Edward H. 1923. Additions to the Herpetological Fauna of the Philippine Islands. III. *Philip. Jour. Sci.*, **22**: 515-557, 3 pls.

Taylor, Edward H. 1925. Additions to the Herpetological Fauna of the Philippine Islands. IV. *Philip. Jour. Sci.*, **26**: 97-111.

Zimmerman.B, (1994). Audio strip transects. *In* Heyer.W.R, Donnelly.M.A., McDiarmid.R.W, Hayek. L.C., Foster. M.S. (eds.), Measuring and monitoring biological diversity, standard methods for amphibians. Smithsonian Institution.

Zimmerman.B.L, and M.T.Rodrigues. (1990). Frogs, snakes and lizards of the INPA-WWF reserves near Manaus, Brazil. Pages 426-454 in A.H.Gentry, editor. Four Neotropical rainforests. Yale University Press, New Haven Connecticut.

Zweifel, R.C., (1985). Australian frogs of the family Microhylidae. *Bull. Amer. Mus. Nat. Hist.* **182**: 265-388

Acknowledgements

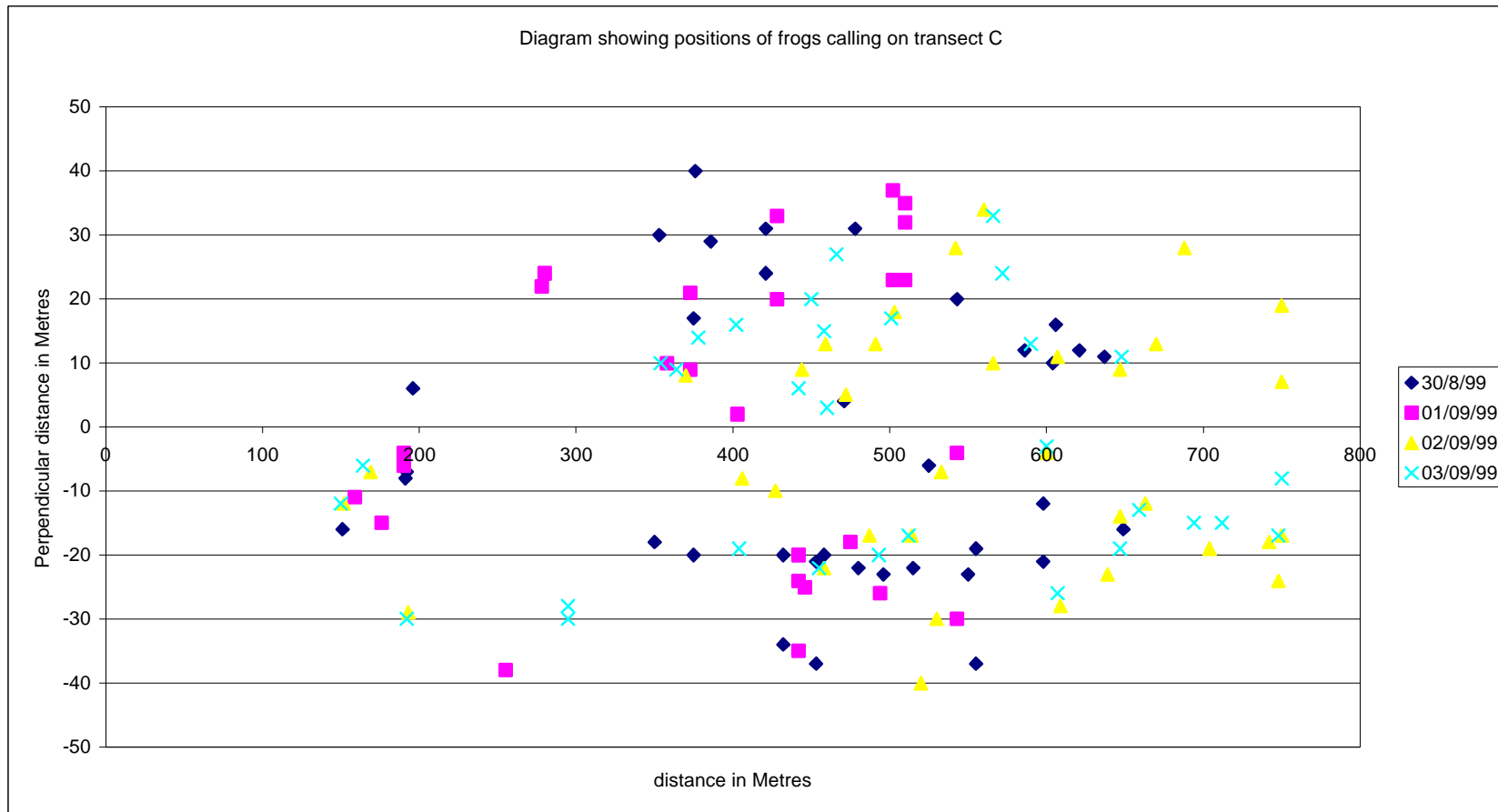
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Appendix I

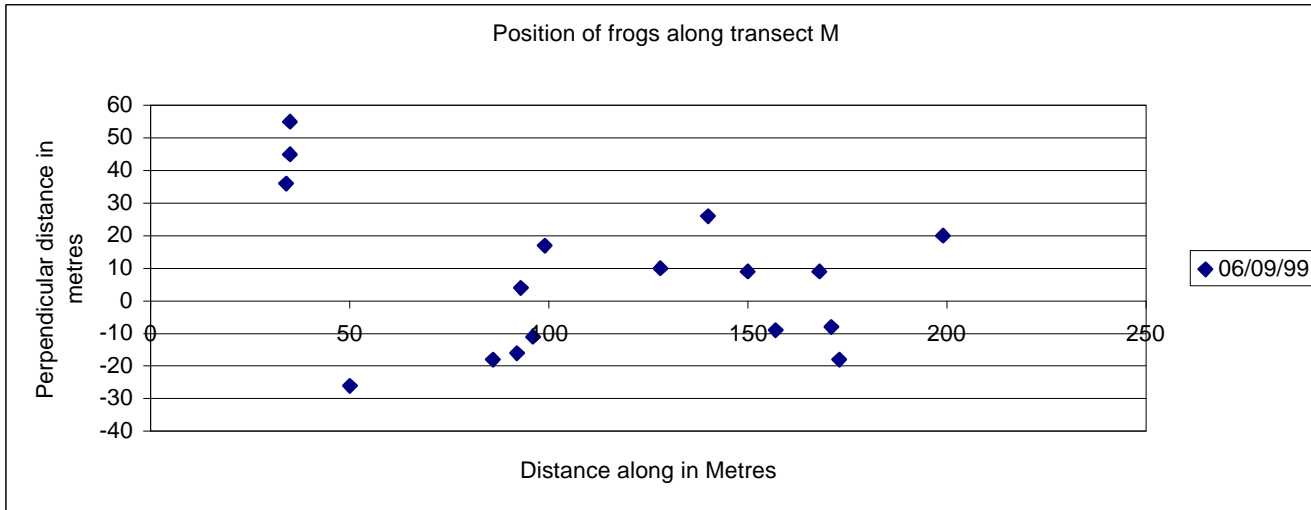
For every site the model chosen by DISTANCE is stated e.g. Hazard/Cosine, the date, the Density D, degrees of freedom and 95% Confidence intervals for the estimate.

Pooled Estimates:

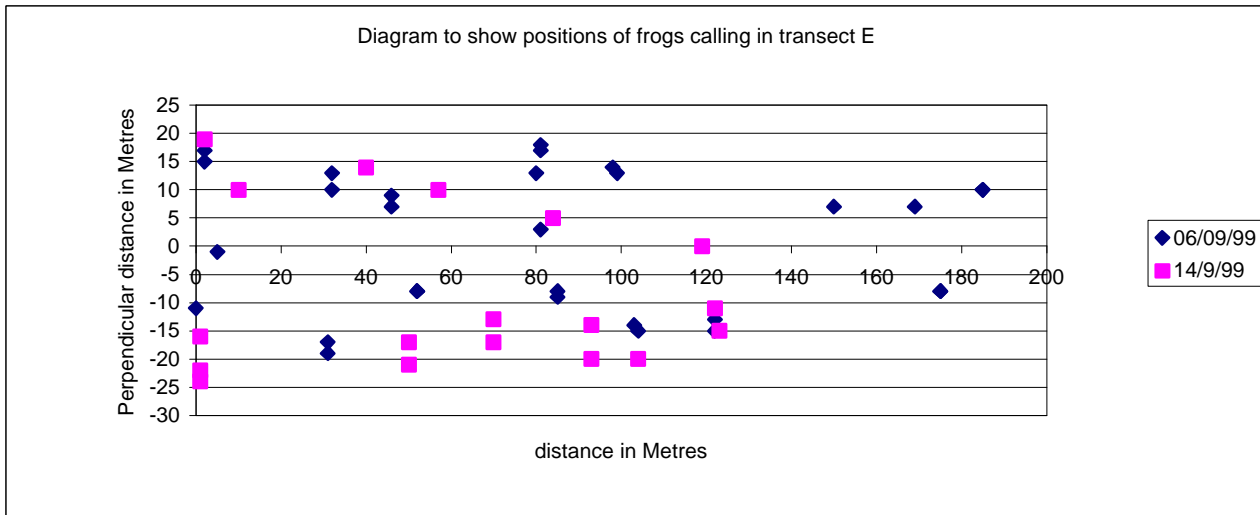
		Estimate	%CV	df	95% Confidence Interval		
SITE E&M combined							
Hazard/Cosine	D	20.306	21.92	4	11.128	37.054	
Edges combined							
Hazard/Cosine	D	7.3304	17.09	3	4.2719	12.579	
Site E							
6/9/99	Uniform/Cosine	D	28.947	21.32	22	18.694	44.824
14/9/99	Uniform/Cosine	D	23.611	24.25	17	14.257	39.102
Site M							
6/9/99	Uniform/Cosine	D	13.051	28.05	16	7.2828	23.390
Forest edge O							
28/8/99	Uniform/Cosine	D	16.420	22.36	20	10.358	26.031
Forest edge A							
25/8/99	Uniform/Cosine	D	11.816	29.47	19	6.4592	21.615
30/8/99	Uniform/Cosine	D	8.0247	27.74	13	4.4572	14.448
31/8/99	Uniform/Cosine	D	7.9365	22.36	20	5.0064	12.582
1/9/99	Uniform/Cosine	D	5.9524	23.57	18	3.6519	9.7019
2/9/99	Uniform/Cosine	D	7.9365	22.36	20	5.0064	12.582
3/9/99	Uniform/Cosine	D	5.2910	25.00	16	3.1394	8.9173
Forest edge C							
30/8/99	Uniform/Cosine	D	3.7500	25.82	15	2.1823	6.4438
1/9/99	Uniform/Cosine	D	4.9342	25.82	15	2.8715	8.4787
2/9/99	Uniform/Cosine	D	6.1687	29.55	19	3.3666	11.303
3/9/99	Uniform/Cosine	D	5.5556	22.36	20	3.5044	8.8072
Edges broken down							
Forest edge A							
25/8/99							
1 st 220m	Uniform/Cosine	D	6.0606	35.36	8	2.7467	13.373
2 nd 220m	Uniform/Cosine	D	10.909	28.87	12	5.8892	20.208
30/8/99							
1 st 150m	Uniform/Cosine	D	9.7222	37.80	7	4.0968	23.072
2 nd 150m	Uniform/Cosine	D	7.4074	40.82	6	2.8341	19.360
31/8/99							
1 st 220m	Uniform/Cosine	D	8.7413	31.62	10	4.3939	17.390
2 nd 220m	Uniform/Cosine	D	9.1991	24.25	17	5.5548	15.235
1/9/99							
1 st 220m	Uniform/Cosine	D	6.0606	35.36	8	2.7467	13.373
2 nd 220m	Uniform/Cosine	D	6.3131	31.62	10	3.1734	12.559
2/9/99							
1 st 220m	Uniform/Cosine	D	6.2696	35.36	8	2.8414	13.834
2 nd 220m	Uniform/Cosine	D	9.0909	28.87	12	4.9077	16.840
3/9/99							
1 st 220m	Uniform/Cosine	D	5.0505	40.82	6	1.9324	13.200
2 nd 220m	Uniform/Cosine	D	6.3131	31.62	10	3.1734	12.559
Forest edge C							
30/8/99							
1 st 200m	Uniform/Cosine	D	6.9444	44.72	5	2.3167	20.816
2 nd 200m	Uniform/Cosine	D	8.7500	26.73	14	4.9810	15.371
3 rd 100m	Uniform/Cosine	D	14.865	30.15	11	7.7660	28.453
1/9/99							
1 st 200m	Uniform/Cosine	D	4.6053	37.80	7	1.9406	10.929
2 nd 200m	Uniform/Cosine	D	9.4595	26.73	14	5.3849	16.617
2/9/99							
1 st 200m	Uniform/Cosine	D	2.5862	57.74	3	.46930	14.252
2 nd 200m	Uniform/Cosine	D	14.828	32.52	14	7.5118	29.270
3 rd 200m	Uniform/Cosine	D	12.500	24.25	17	7.5479	20.701
3/9/99							
1 st 200m	Uniform/Cosine	D	4.1667	44.72	5	1.3900	12.490
2 nd 200m	Uniform/Cosine	D	12.963	26.73	14	7.3793	22.772
3 rd 200m	Uniform/Cosine	D	9.0909	28.87	12	4.9077	16.840
Edge transect O							
1 st 150m	Uniform/Cosine	D	14.286	33.33	9	6.8554	29.770
2 nd 150m	Uniform/Cosine	D	17.460	30.15	11	9.1220	33.421

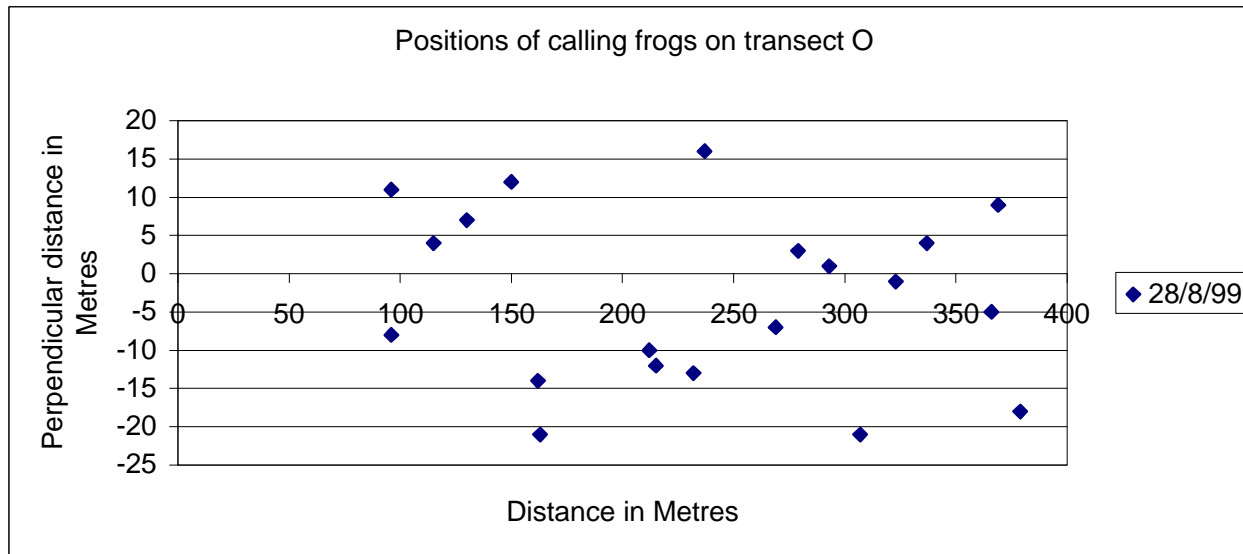


Transect C runs past the tanks into the forest following the stream. All of the transects stopped at 750m apart from on the 2/9/99, which stopped at 650m



Transect M runs through site M and stops after 200m. Transect E runs through site E. The transect on the 14/9/99 stops at 150m, the transect on the 6/9/99 stops after 200m.





Transect O enters the forest from the far side of the watershed, the exact position is unknown.

Appendix III

Densities of frogs per square metre, for every site

	A	O	B	N	H	G	F	L	J	M	K	D	E
Bm	0.042	0	0.004	0.004	0	0	0	0	0	0	0	0	0
Rvl	0.052	0.156	0	0.006	0	0	0	0	0	0	0	0	0
Rw	0.004	0.006	0.023	0.077	0.15	0.163	0.104	0.25	0.11	0.242	0.267	0.152	0.21
Rss	0	0.002	0.038	0.01	0.048	0.048	0.027	0.046	0.052	0.035	0.063	0.077	0.083
Pl	0.019	0	0	0.004	0	0	0	0	0	0	0	0	0
Pd	0	0	0.006	0.021	0.052	0.063	0.042	0.056	0.085	0.102	0.063	0.058	0.102
Rm	0	0	0.002	0.002	0	0.002	0	0.002	0.002	0	0.002	0	0.006
OI	0	0.069	0	0.01	0.052	0.104	0.096	0.183	0.121	0.098	0.15	0.115	0.148
Psp	0	0	0	0	0	0	0	0.008	0	0	0.004	0.002	0.006
Pc	0	0	0	0	0	0.002	0.008	0	0.002	0	0.006	0.008	0.008
Re	0	0	0	0	0.019	0	0	0	0.004	0	0	0.008	0.004
Total	0.117	0.233	0.073	0.135	0.321	0.381	0.277	0.546	0.377	0.477	0.554	0.421	0.569