Tables of GAM results in paper

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2017-09-02

```
# root dir
knitr::opts_knit$set(root.dir =
                       "C:/Users/rver4657/ownCloud/Virtual Experiments/VirtExp")
knitr::opts_chunk$set(echo = TRUE)
# LOAD REQUIRED PACKAGES # #####
library(pander)
library(tidyr)
library(xts)
library(zoo)
library(Kendall)
library(mgcv)
```

This rmarkdown document and the resulting pdf are stored on github. All directories (apart from the root working directory) refer to the directories in this repository.

Introduction

This document is related to the manuscript "Disentangling climate change trends in Australian streamflow" (vervoort et al.), submitted to Journal of Hydrology.
This document is a further component on the analysis of the streamflow data using Generalised Additive models (GAM) testing for a trend in the data, or testing for a trend in the residuals (part 3 of the series). This document, part 3A, only creates table 4, 5, 6 in the Manuscript and back transforms the trends. The data for this document has been generated in document 3 and was stored in a temporary directory called **"../projectdata"**, so one directory up and then a directory called "projectdata". This directory is not included on github, as this data can be regenerated using document 3. Only the results using the precipitaion data from the rainfall stations is used here as the results from the gridded rainfall are not different.

Table 4

This table combines the results of model 1 and model 2, or the simple trend analysis for flow (Q) and precipitation (P).

```
# read in the flow data (a data frame called Store2)
load("../projectdata/Store2_TrendOnlyAnalysis.RData")

Flow <- do.call(rbind, lapply(1:length(Store2), function(i) rbind(Store2[[i]][[2]])))

# read in the Precipitation data (a data frame called Store_Rain)
load("../projectdata/StoreRain_TrendAnalysis.RData")
Rain <- do.call(rbind, lapply(1:length(Store_Rain),
                      function(i) rbind(Store_Rain[[i]][[2]])))

# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
```

```
Table4 <- data.frame(Station = Flow$Station,
                     Qtrend = Flow$Value, Qpvalue = Flow$p.value,
                     Q_mm_year = ifelse(Flow$p.value < 0.1,
                                        (exp(Flow$Value)-1)*52,NA),
                     Ptrend = Rain$Value, Ppvalue = Rain$p.value,
                     P_mm_year = ifelse(Rain$p.value < 0.1,
                                        (exp(Rain$Value)-1)*52,NA))
# now save the table as a csv file
write.csv(Table4, "../projectdata/Table4.csv", row.names=F)
# show table
pander(Table4, caption = "This is Table 4 in the manuscript")
```

Table 1: This is Table 4 in the manuscript

Station	Qtrend	Qpvalue	Q_mm_year	Ptrend	Ppvalue	P_mm_year
COTT	-0.0002592	0.0285	-0.01348	-0.0003816	8.77e-06	-0.01984
RUTH	-0.0005892	3.149e-14	-0.03063	-0.0001305	0.03456	-0.006785
CORA	-0.0002107	0.00178	-0.01095	-4.979e-05	0.3874	NA
ELIZ	4.887e-06	0.9848	NA	-0.0003745	0.06944	-0.01947
COCH	-5.77e-06	0.9613	NA	-0.0006523	1.916e-06	-0.03391
COEN	-2.977e-05	0.8874	NA	-5.208e-05	0.7176	NA
SCOT	-8.134e-05	0.3733	NA	-7.987e-05	0.2414	NA
HELL	-0.0001375	0.2707	NA	-0.000191	9.632e-05	-0.00993
NIVE	-6.446e-05	0.718	NA	-7.42e-05	0.2209	NA
MURR	-0.0002164	0.001545	-0.01125	-9.83e-05	0.0713	-0.005112
SOUT	-0.0001543	0.01232	-0.008022	-0.0001819	4.055e-05	-0.009456
YARR	-0.0001143	0.02487	-0.005941	-0.0001191	0.2118	NA
DOMB	-0.0001237	0.5306	NA	-0.0002795	0.003782	-0.01453

Table 5

This table combines the results of model 3, which is the GAMM analysis for flow (Q) taking into account the effect of precipitation (P). The AIC values are given to allow comparison with Table 6 in the manuscript.

```
# read in the results of model 3 (a data frame called Store_Fwr)
load("../projectdata/StoreFwR_TrendAnalysis.RData")

Flow <- do.call(rbind, lapply(1:length(Store_FwR),
                              function(i) rbind(Store_FwR[[i]][[2]])))

# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
Table5 <- data.frame(Station = Flow$Station, AIC = Flow$AIC,
                     Qtrend = Flow$Value, Qpvalue = Flow$p.value,
                     Q_mm_year = ifelse(Flow$p.value < 0.1,
                                        (exp(Flow$Value)-1)*52,NA))
# now save the table as a csv file
write.csv(Table5, "../projectdata/Table5.csv", row.names=F)
# show table
pander(Table5, caption = "This is Table 5 in the manuscript")
```

Table 2: This is Table 5 in the manuscript

Station	AIC	Qtrend	Qpvalue	Q_mm_year
COTT	807.7	-0.0002635	0.1214	NA
RUTH	1519	-0.0005527	6.471e-11	-0.02873
CORA	3700	-0.0001906	0.0007155	-0.009908
ELIZ	2813	-0.000197	0.4233	NA
COCH	1439	-0.0001328	0.3417	NA
COEN	2859	-2.843e-05	0.8813	NA
SCOT	1603	-7.227e-05	0.4154	NA
HELL	2361	-0.0001427	0.2644	NA
NIVE	3014	-8.442e-05	0.6261	NA
MURR	-472.7	-0.0001986	0.004321	-0.01033
SOUT	1082	-0.0001322	0.0259	-0.006873
YARR	-417.6	-0.000118	0.01033	-0.006135
DOMB	1926	-0.0002598	0.1395	NA

Table 6

This table combines the results of model 4 and 5, which is the GAMM analysis for flow (Q) taking into account the effect of precipitation (P) and actual ET via s(P,maxT). The AIC values are given to allow comparison with Table 5 in the manuscript.

```
# read in the results of model 4 (a data frame called Store_FwRE)
load("../projectdata/StoreFwRE_TrendAnalysis.RData")

Flow_m4 <- do.call(rbind, lapply(1:length(Store_FwRE),
                           function(i) rbind(Store_FwRE[[i]][[2]])))

# read in the results of model 5 (a data frame called Store_FwRE2)
load("../projectdata/StoreFwRE_Analysis.RData")

Flow_m5 <- do.call(rbind, lapply(1:length(Store_FwRE2),
                           function(i) rbind(Store_FwRE2[[i]][[2]])))
# load "real_df" with results Mann-Kendall for Model 5
load("../projectdata/MKResidGAM_MDPaper.Rdata")



# create a data frame that combines the relevant columns
# if p.value < 0.1 do not calculate the annual trend
Table6 <- data.frame(Station = Flow_m4$Station, AIC = Flow_m4$AIC,
                     Qtrend = Flow_m4$Value,
                     Qpvalue = Flow_m4$p.value,
                     Q_mm_year = ifelse(Flow_m4$p.value < 0.1,
                                 (exp(Flow_m4$Value)-1)*52,NA),
                     AIC_5 = Flow_m5$AIC,
                     MK_tau = real_df$tau,
                     MK_pvalue = real_df$pvalue)

# now save the table as a csv file
write.csv(Table6, "../projectdata/Table6.csv", row.names=F)
```

```
# show table
pander(Table6, caption = "This is Table 6 in the manuscript")
```

Table 3: This is Table 6 in the manuscript

Station	AIC	Qtrend	Qpvalue	Q_mm_year	AIC_5	MK_tau	MK_pvalue
COTT	749.1	-0.0002282	0.154	NA	749.1	-0.05596	0.002394
RUTH	1475	-0.0005415	4.384e-11	-0.02815	1507	-0.1547	0
CORA	3347	-0.000195	0.0009571	-0.01014	3355	-0.04502	0.002975
ELIZ	2726	-0.0001815	0.4428	NA	2724	-0.0208	0.1877
COCH	1362	-0.000131	0.3165	NA	1361	-0.02305	0.1764
COEN	2709	-4.817e-06	0.9785	NA	2707	0.02312	0.1292
SCOT	1356	-8.012e-05	0.2356	NA	1355	-0.01845	0.2107
HELL	2113	-0.0001206	0.1994	NA	2113	-0.0291	0.06842
NIVE	2922	-6.754e-05	0.6476	NA	2920	-0.009223	0.5471
MURR	-670.3	-0.0001848	0.003078	-0.009606	-664.1	-0.05042	0.0005784
SOUT	1013	-0.0001189	0.01581	-0.006183	1017	-0.0516	0.000755
YARR	-491.7	-0.0001128	0.00571	-0.005866	-486.4	-0.02476	0.08815
DOMB	1811	-0.0002406	0.07439	-0.01251	1812	-0.05786	0.0003182