

Table S1. List of RNA family groups and the number of sequences in the ncRNA benchmark. The families are grouped according the Rfam ID in the *Rfam* database 14.6.

RNA family group	Number of sequences	RNA family group	Number of sequences
RP L31 leader	2784	DUF RNA	2681
Twister ribozyme	1827	RAGATH RNA	1560
pemK RNA	1538	skipping-rope RNA	1423
S15-RNA	1167	Intron RNA	1144
SAM-RNA	880	RT-RNA	710
5S rRNA	691	glnA-RNA	647
Cyclic di-GMP riboswitch	624	S4-RNA	620
tRNA	584	IMES RNA	578
Downstream-peptide RNA	569	RP EL15 leader	536
algC RNA	492	raiA RNA	485
GA-cis RNA	481	chrB RNA	475
C4-2 RNA	469	tmRNA	466
drum RNA	463	RP L19 leader	459
RNase P class A	450	RP L2 leader	449
EFASI RNA	448	PhotoRC RNA	444
SpF59 sRNA	410	RP L17 leader	408
miRNA	404	NMT1 RNA	382
RP L25 leader	381	RP L4 leader	376
RP L13 leader	370	LOOT RNA	368
Transposase RNA	326	malK RNA	320
Mu-gpT-DE RNA	314	Clostridiales RNA	313
narK RNA	305	ROOL RNA	289
nhaA-I RNA	281	IsrR	279
6A RNA	273	crcB RNA	263
SRP RNA	261	Cobalamin Riboswitch RNA	260
IS605-orfB-I RNA	259	Rhodo-rpoB RNA	259
ivy-DE RNA	245	Actinomyces-1 RNA	234
Cyano-1 RNA	226	GP20 RNA	210
U2 snRNA	206	Flavobacterium-1 RNA	205
uup RNA	203	Freshwater-2 RNA	199
RP S10 Leader	199	U6 spliceosomal RNA	187
nadA RNA	182	U5 spliceosomal RNA	179

U4 spliceosomal RNA	174	ZMP/ZTP Riboswitch	173
FuFi-1 RNA	169	int-alpA RNA	167
manA RNA	165	TwoAYGGAY RNA	162
Moco RNA	159	Cyclic di-GMP-I riboswitch	155
engA RNA	154	Hatchet ribozyme	153
Entero 5 CRE	153	leuA-Halobacteria RNA	152
6S RNA	147	Bacilli-1 RNA	145
AdoCbl variant RNA	145	FMN riboswitch	144
M-box riboswitch	142	dfrA-dnaX RNA	138
potC RNA	136	Peptidase-S11 RNA	135
lysM-TM7 RNA	129	terC RNA	129
RP S16 leader	129	DABA-DC-AT RNA	126
abiF RNA	126	HIV-RF RNA	123
cyVA-1 RNA	122		

Table S2. List of RNA family groups and the number of sequences for testing ncRNAs outside the benchmark. The families are grouped according the Rfam ID in the *Rfam* database 14.6.

RNA family group	Number of sequences
RP L20 leader	116
RNase P class B	113
RT-10 RNA	113
Twister-sister ribozyme	112
HCV SLIV	109
gltS RNA	108
DUF3268 RNA	106
tRNA-SeC	105
ssNA-helicase RNA	104
RP S15 leader	100

Table S3. Performance evaluation results based on the ncRNA benchmark with the redundant sequences removed.

	ACC	SEN	PPV	F-Score	Log ₁₀ (Time)
REDfold	0.893	0.893	0.880	0.887	2.513
<i>RNAfold</i>	0.532	0.639	0.501	0.562	1.940
<i>RNAstructure</i>	0.527	0.629	0.497	0.555	3.154
<i>Probknot</i>	0.540	0.644	0.508	0.568	3.488
<i>CONTRAFold</i>	0.583	0.665	0.546	0.600	2.616
<i>SPOTRNA</i>	0.663	0.654	0.637	0.645	4.913
<i>Ufold</i>	0.828	0.871	0.787	0.827	4.303
<i>E2Efold</i>	0.284	0.161	0.190	0.175	4.311
<i>MXfold2</i>	0.638	0.640	0.609	0.624	3.700