CLAIMS

1. A composition comprising a non-naturally occurring complex comprising:
(a) a CasZ polypeptide, or a nucleic acid encoding said CasZ polypeptide; and
(b) a non-naturally occurring CasZ guide RNA, or a nucleic acid encoding said non-naturally occurring CasZ guide RNA, wherein said CasZ guide RNA comprises a region that binds to the CasZ polypeptide and a guide sequence that is complementary to a target sequence of a target nucleic acid, and wherein the CasZ polypeptide comprises an amino acid sequence having 95% or more identity with SEQ ID NOS: 3, 8, or 12, and wherein the target nucleic acid is a eukaryotic DNA.

2. The composition of claim 1, further comprising a transactivating noncoding RNA.

3. The composition of claim 1, further comprising the target nucleic acid.

4. The composition of claim 3, wherein the target nucleic acid is single stranded DNA.

5. The composition of claim 4, wherein the target nucleic acid lacks a PAM sequence.

6. The composition of claim 3, wherein the target nucleic acid is double stranded DNA.

7. The composition of claim 1, wherein the target nucleic acid is single stranded DNA.

8. The composition of claim 7, wherein the target nucleic acid lacks a protospacer adjacent motif (PAM) sequence.

9. The composition of claim 1, wherein the target nucleic acid is double stranded DNA.

10. The composition of claim 1, further comprising a donor polynucleotide.

11. The composition of claim 1, further comprising a cell.

12. The composition of claim 11, wherein the cell comprises the CasZ polypeptide, or the nucleic acid encoding the CasZ polypeptide, and the non-naturally occurring guide nucleic acid, or the nucleic acid encoding the non-naturally occurring guide nucleic acid.

13. The composition of claim 11, wherein the cell is a eukaryotic cell.

14. The composition of claim 1, wherein the CasZ polypeptide is conjugated to a heterologous moiety.

15. The composition of claim 14, wherein the heterologous moiety is a heterologous polypeptide.

16. The composition of claim 15, wherein the heterologous polypeptide comprises a nuclear localization signal.

17. The composition of claim 1, wherein the composition further comprises a second CasZ polypeptide, wherein the second CasZ polypeptide comprises an amino acid sequence having 95% or more identity with SEQ ID NOS: 3, 8, or 12.

18. A method of cleaving a target nucleic acid in a cell, the method comprising delivering into the cell a CasZ polypeptide and a non-naturally occurring guide nucleic acid comprising a region that binds to the CasZ polypeptide and a guide sequence that is complementary to a target sequence of the target nucleic acid, wherein the CasZ polypeptide and the guide nucleic acid form a complex

wherein the cleaving is performed by the complex, and

wherein said CasZ polypeptide comprises an amino acid sequence having 95% or more identity with SEQ ID NOS: 3, 8, or 12.

19. A composition comprising a complex comprising:

(a) a fusion polypeptide, or a nucleic acid encoding said fusion polypeptide, the fusion polypeptide comprising:

i) a CasZ polypeptide comprising an amino acid sequence having 95% or more identity with SEQ ID NOS: 3, 8, or 12; and

ii) a heterologous fusion partner; and

(b) a CasZ guide RNA, or a nucleic acid encoding said CasZ guide RNA, wherein said CasZ guide RNA comprises a region that binds to the CasZ polypeptide and a guide sequence that is complementary to a target sequence of a target nucleic acid.